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Taxonomy and Distribution of *Desmodium* and Related Genera (Leguminosae) in Malesia (II)

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This second part of my revision of Malesian *Desmodium* and its relatives includes taxonomic treatments of the following eight genera, *Hanslia* (including two new combinations), *Hegnera*, *Hylodesmum*, *Monarthrocarpus*, *Ohwia*, *Phyllodium*, *Tadehagi*, and *Trifidacanthus*, and phytogeographic considerations for the taxa of *Desmodium* and its relatives in Malesia. Thirteen genera and 64 species are recognized as *Desmodium* and its relatives in Malesia. Their distribution patterns are diverse. Of 64 species recognized in this study 56 are native to Malesia and are divided by their distribution patterns into the following four groups: Malesia (including 8 species), Asia (29 spp.), Australia (11 spp.), and Asia-Australia (8 spp.) groups. All species of the genera native to Jawa, New Guinea and the Philippines are discussed. Each area has almost equal numbers of native species, 31, 32, and 29, respectively. This fact suggest insufficient collections in New Guinea and the Philippines. The present-day composition and distribution of taxa in *Desmodium* and related genera in Malesia are considered to be derived from various spatially and temporally diverse ancestors.

Key words: *Desmodium* relatives, distribution patterns, *Hanslia*, Jawa, New Guinea.

HANSLIA

Hanslia Schindl. in Repert. Spec. Nov. Regni Veg. **20**: 276 (1924) [Type: *Hanslia adhaerens* Schindl. (= *Hedysarum adhaerens* Poir., non Vahl.)].

Desmodium subg. *Hanslia* (Schindl.) H. Ohashi in Ginkgoana **1**: 112 (1973); Pedley in Austrobaileya **5**: 226 (1999).

Hanslia is similar to *Ohwia* in having a scarcely developed rim-aril around the hilum of seeds, uncinate hairs on the loments, long articles, and a coarser, reticulate sculpture on pollen grains. They are considered to be related to each other. *Ohwia* and *Hanslia ormocarpoides* have white to creamy flowers, but *H. hentyi* has purple to pink flowers.

The genus comprises two species and both are found in Malesia.

Key to the species of *Hanslia*

1. Leaves 3-foliolate, rarely mixed with 1-foliolate; leaflets acute at base ... *H. hentyi*
1. Leaves 1-foliolate; leaflets round at base .... *H. ormocarpoides*

Hanslia hentyi (Verdc.) H. Ohashi, comb. nov. (Fig. 5)

Desmodium hentyi Verdc. in Kew Bull. **32**: 249 (1977) [Type: Papua New Guinea. Morobe District: near Lae, Atzera Range, 6°45′S., 147°00′E. 210 m. 1 Mar. 1960. Shrub, standard reddish purple, keel and wings pale pink, pod purple, adhesive. Henty in NGF11922 (LAE holo., K-photo)] & Verdc., Man. New Guinea Leg.: 398, fig. 94-o (1979).

Distr.: **Malesia** (New Guinea and new to

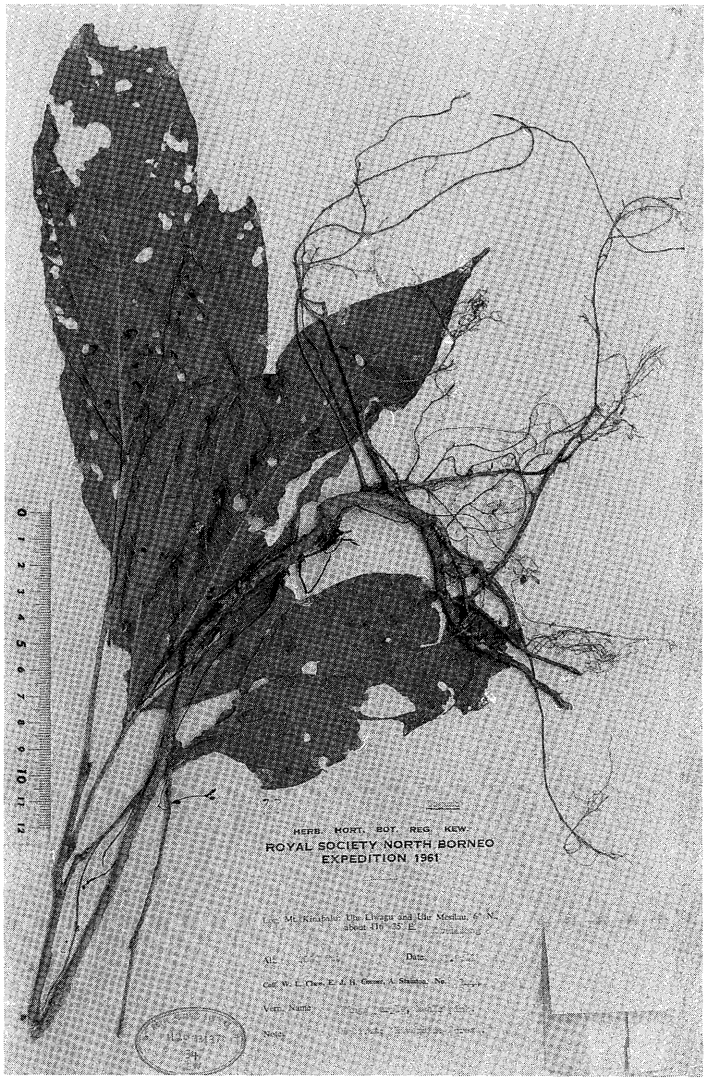
HERB. HORT. BOT. REG. KEW.
ROYAL SOCIETY NORTH BORNEO EXPEDITION 1961

Fig. 5. *Hanslia hentyi* (Verdc.) H. Ohashi. Borneo. Mt. Kinabalu. Chew & al. 1444 (K).

Borneo).

Specimens examined: **Borneo**. Mt. Kinabalu. Ulu Liwagu and Ulu Mesilau, 6°N., about 116°35′E. Kundasang. Wings purple, keels pink. Riverside Forest. 3 Sept. 1961 Chew, Corner & Stainton 1444 (K). **New Guinea**. Atzera Range near Lae, alt. 700 ft. Henty 11922 (LAE holo.; photo K); Kokoda. Herb, ca. 2 ft. tall. N.G. Carr 16300, 28 Mar. 1936 (L); Conn & al. 35 (LAE 232235; photo TUS).

Leaves of this species have three leaflets or rarely with single leaflets on the same plant. This species occurs under forest and such habitat is supposed to be similar with that of *Hylodesmum laxum* and *H. leptopus*.

Hanslia ormocarpoides (DC.) H. Ohashi, comb. nov.

Hedysarum adhaerens Poir. in Lam., Encycl. Suppl. **5**: 15 (1817), non Vahl. (1791). [Type: Java. Labillardière (P, n. v.)].

[*Hedysarum ormocarpum* Desv. ex Poir.

in Lam., Encycl. Suppl. **5**: 15 (1817), pro syn.].

Desmodium ormocarpoides DC., Prodr. **2**: 327 (1825) [Type: 'Cette plante a été découverte à l'île de ava par M. de Labillardìere' (P ?) (fide Pedley 1999)]; Merr. in Philipp. J. Sci. **14**: 409 (1919) & Enum. Philipp. Flow. Pl. **2**: 287 (1923); Meeuwen in Reinwardtia **6**: 96 (1961) & 255 (1962); H. Ohashi in Ginkgoana **1**: 113 (1973); Verdc., Man. New Guinea Leg.: 403 (1979); Pedley in Austrobaileya **5**: 231 (1999).

D. dependens Blume ex Miq., Fl. Ned. Ind. **1**(1): 248 (1855) [Type: Molucc. Unknown collector. (L holo. 908.115-521)].

D. pendulum F. Muell. in Campbell, A Year New Hebrides: 9 (1873) [Type: Tana. Campbell (?)]; F. Muell., Fragm. **8**: 225 (1874).

Hanslia adhaerens Schindl. in Repert. Spec. Nov. Regni Veg. **20**: 277 (1924).

Distr.: **Malesia**, Australia (N. Queensland) and Pacific (New Hebrides, Solomon Is.: W. Guadalcanal).

Specimens examined: **Lesser Sunda Is**. Timor. Steenis 18165 (BO). **Maluku**. Ambon. Teysmann s. n. in anno 1907 (BO), Robinson 556 (A, BM, BO, K, NY, US). Buru. Van Balgooy 4684 (K, L). **New Guinea**. Mafulu. Brass 5268 (BO, NY, US); Kassam-Water Rice Road. Brass 32316 (A, NY, PNH, US); W. Sect. Papua. Tributary of Laloki River 2 miles E of Rouna. T. G. Hartley 10715 (TI). **Philippines**. Jolo. Ramos & Edano Bur. Sci. 44391 (BM, BO, US). **Sulawesi**. Boton, SE of Sulawesi. Coode s. n. (K); Gorontalo. Riedel s. n. (K); G. Konkeonkea. van Vuuren 750 (BO).

Desmodium ormocarpoides is recorded by Merrill (1910) from Luzon (Whitford 865), Mindoro (Merrill 6223), Samar (Merrill 5201), Cebu (McGregor Bur. Sci. 1731) and Mindanao (Mrs Clemens 632), but these specimens are all referable to *D. zonatum* Miq.

The ovary of this species is densely covered with white, straight hairs. These hairs become hooked when the loments mature. The loment is reticulate-veined, although it was described as not reticulate-veined in Ohashi (1973) based on young loments.

HEGNERA

Hegnera Schindl. in Repert. Spec. Nov. Regni Veg. **20**: 284 (1924) [Type: *Hegnera obcordata* (Miq.) Schindl. (= *Uraria obcordata* Miq.)]; H. Ohashi in Ginkgoana **1**: 257 (1973); Dy Phon in Dy Phon & al., Fl. Camb. Laos Vietn. **27**: 60 (1994).

The genus is monotypic.

Hegnera obcordata (Miq.) Schindl. in Repert. Spec. Nov. Regni Veg. **20**: 285 (1924); H. Ohashi in Ginkgoana **1**: 257 (1973).

Uraria obcordata Miq., Fl. Ned. Ind. Eerste Bijv. **1**: 305 (1860) [Type: Sumatra orient. Prov. Palembang. prope Muaraduwa. Teysmann (L holo.; iso. K)].

Desmodium obcordatum (Miq.) Kurz in J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. **42**: 229 (1874): Meeuwen in Reinwardtia **6**: 255 (1962); Backer & Bakh. f., Fl. Java **1**: 604 (1963).

Distr.: Myanmar, Thailand, Indo-China, and **Malesia**.

Specimens examined: **Jawa**. H. Zollinger 1628 (K); Maduera Island. Backer 20727 (BO, L). **Malaya**: Kedah. Henderson s.n. in anno 1933 (BO), Researow s. n. Dec. 1933 (K). **Sumatera**. Palemb. Teysmann 3909413 (BO iso. of *Uraria obcordata* Miq.?).

Uraria obcordata Miq. was recognized first by Bentham (1865a) as belonging to *Desmodium*. He classified the species as a member of subsect. Nephromeria Benth. in *Desmodium* sect. Heteroloma Benth., but did not publish a new combination.

HYLODESMUM

Hylodesmum H. Ohashi & R. R. Mill in Edinb. J. Bot. **57**: 173 (2000) [Type: *H. podocarpum* (DC.) H. Ohashi & R. R. Mill (= *Desmodium podocarpum* DC.)]; H. Ohashi [in Sci. Rep. Tohoku Univ. ser. 4, Biol. **40**: 235 (1999), nom. nud.] in K. Iwats. & al., Fl. Jap. **IIb**: 256 (2001).

Desmodium sect. *Podocarpium* Benth. in Miq., Pl. Jungh.: 226 (1852), p. p., excl. *D. axillare* & *D. securiforme* [Type: *Desmodium podocarpum* DC.]; Isely in Brittonia **7**: 185 (1951).

Papilionopsis van Steenis in Nova Guinea, Bot. **3**: 17 (1960) [Type: *Papilionopsis stylidioides* van Steenis], nom. rej. prop. (cf. Ohashi and Mill in Taxon **53**: in press (2004)).

Desmodium sect. *Heteroloma* subsect. *Podocarpia* Benth. in Benth. & Hook. f., Gen. Pl. **1**: 520 (1865).

Desmodium subgen. *Podocarpium* (Benth.) H. Ohashi in Ginkgoana **1**: 120 (1973) p. p., excl. sect. *Monarthrocarpus* (Merr.) H. Ohashi, p. p. excl. *D. dolabriforme* Benth.

Podocarpium (Benth.) Y. C. Yang & P. H. Huang in Bull. Bot. Lab. North-East. Forest. Inst. **4**: 4 (1979) & in Fl. Reipubl. Popul. Sin. **41**: 47 (1995), nom. illegit., non A. Braun ex Stizenb., Uebers. Verstein. Baden: 90 (1851; fossil Leguminosae) nec Unger in C. G. F. Hochst., Paläontol. Neu-Seeland, Geol. Theil **1** (2): 13 (post Nov. 1864; fossil Podocarpaceae).

Hylodesmum H. Ohashi & R. R. Mill is composed mostly of *Desmodium* subgenus Podocarpium. It is morphologically characterized by Ohashi (1973) and Ohashi and Mill (2000). Its herbaceous habit and preference for forest habitats are other characteristic features for the genus. It was considered by Ohashi (1973) to be one of the most advanced genera in *Desmodium* and its relatives and to be a group evolved from *Desmodium* subgenus Dollinera (Ohashi 1971, Kajita and Ohashi 1994).

The genus comprises 14 species of which four are found in Malesia.

Key to the species of *Hylodesmum* in Malesia

1. Calyx-lobes not shorter than the tube; primary bracts ovate to broadly ovate; pedicels 15–30(–40) mm long; flowers longer than 8 mm; stipules patent or reflexed, 10–25 mm long, 2–3 mm wide; leaflets slightly undulate along the margin; corolla orange to red .... *H. repandum*
1. Calyx-lobes much shorter than the tube; primary bracts narrowly ovate or narrowly triangular, less than 2 mm wide; pedicels 2–20 mm long; flowers less than 10 mm long; stipules as cending or erect, less than 10 mm long and 2 mm wide; leafletsentire; corolla pale pink 2
2. Principal lateral nerves reaching the margin; fruit stipes usually less than 7(–10) mm long .... *H. podocarpum*
2. Principal lateral nerves looped within the margin; fruit stipes usually more than 10 mm long 3
3. Articles 12–18 mm long; leaflets with white spots and indistinct nerves............. .... *H. leptopus*
3. Articles 9–10 mm long; leaflets pale green and with distinct nerves beneath .... *H. laxum*

Hylodesmum laxum (DC.) H. Ohashi & R. R. Mill in Edinb. J. Bot. **57**: 178 (2000). (Fig. 6)

Desmodium laxum DC. in Ann. Sci. Nat. (Paris) **4**: 102 (1825) [Type: Nepal. Wallich (G-DC)]; Merr., Enum. Philipp. Flow. Pl. **2**: 287 (1923), p. p., excl. syn. *D. gardneri* et *D. leptopus*; Meeuwen in Reinwardtia **6**: 253 (1962), p. p., excl. syn. *D. leptopus*, *D. japonicum* Miq.; Backer & Bakh. f., Fl. Java **1**: 604 (1963); H. Ohashi in Ginkgoana **1**: 134 & 139 (1973), as subsp. *laxum*; Verdc., Man. New Guinea Leg.: 401 (1979).

D. gardneri Benth. in Miq., Pl. Jungh.: 226 (1852), p. p., incl. specim. cit “In Ceylona, Gardner 220 (K syn.)”.

D. elongatum Zoll. & Moritzi in Nat. en

Geneesk, Arch. Neêrl. Ind. **3**: 58 (1846).

D. bambusetorum Miq., Fl. Ned. Ind. **1**(1): 256 (1855) [Type: Jawa. Tusschen de Bamboes-struiken op de hellingen van Amprong bij Gebok Klakka. Herb. Zollinger 2537 (L908.115-349)].

D. podocarpum var. *laxum* (DC.) Baker in Hook. f., Fl. Brit. India **2**: 165 (1876).

Podocarpium laxum (DC.) Y. C. Yang & P. H. Huang in Bull. Bot. Lab. N. E. Forest. Inst., Harbin **4**: 7 (1979), nom. illegit.

Distr.: Sri Lanka, India, Nepal, Thailand, Indo-China, **Malesia**, Solomon Is. (Guadalcanal), China, and Japan.

Specimens examined: **Borneo**. Sarawak. Y. P. Ching S. 44685 (K). Jawa. Hasskarl s. n. (L 908.115-349), Backer 37187 (L). Bali. Soenda. Steenis 8086 (L); Slooten 8086 (A). **Lesser Sunda Is**. Sumbawa. Mt. Batulanteh, moist *Dipterocarpus retusus* forest, 500–700 m alt. Kostermans 18759 (BO, K, L). **Maluku**. Buru: Wae Kose, primary forest, on a riverside, 0–50 m alt. Mogea & Ismail JPM-5203 (BO, K). **New Guinea**. Schlechter 14106 (BM, K); Schlechter 19009 (NY); Vogelkop Peninsula. Aifat river valley, alt. 750 m. P. van Royen & H. Sleumer 6914 (A, K, L); Morobe district. Kauli Lake, alt. 4500 ft., alongside creek in *Castanopsis* forest. A. Kairo 45433 (A, K); W. of Bulolo. Frodin & Hill (NY); Path at top of Atzera range, alt. 600 ft. Verdcourt & al. 5100 (K). **Philippines**. Luzon. Mt. Province, Banaue, Mt. Taggute. Dr. Cinklin & del Rosario PNH72413 (A, K, L, PNH); Elmer 22372 (A, BM, L, NY). Mindanao. Elmer 11216 (A, BM, CAL, E, L, NY; photo TUS), Elmer 13820 (A, BM, CAL, L; photo TUS). Negros. Elmer 10029 (A, BM, E, L, NY); Gutierrez & al. PNH 108894 (PNH). **Sarawak**. Proposed G. Murud National Park, 4th Division, mixed *Dipterocarp* forest at 1200 m. Yii Puan Ching S-44685 (K). **Sulawesi**. Sulawesi Utara, 220 m. de Vogel & Vermeulen 6561 (L), Burley & al. 3750 (A).

Hylodesmum laxum shows a much variation in the shape of leaflets in the Philippines. Elmer 10029 (A) and others have a narrowly elliptic terminal leaflet, and Elmer 13820 (A) has an ovate one, but Elmer 22372 (A) has a narrowly elliptic one in the lower leaves and an ovate one in the upper leaves.

The specimens from the Philippines, Elmer 11216 (CAL) and 13820 (CAL), were cited by Ohashi (1973) as *Desmodium laxum* subsp. *leptopus*, but they were erroneous for *Hylodesmum laxum*.

Hylodesmum leptopus (A. Gray ex Benth.) H. Ohashi & R. R. Mill in Edinb. J. Bot. **57**: 179 (2000).

Desmodium leptopus A. Gray ex Benth. in Miq., Pl. Jungh.: 226 (1852) [Type: Philippines. Luzon. Exped. Explor. Americanas. (K lecto.; isolecto. GH, US)]; Miq., Fl. Ned. Ind. **1**(1): 255 (1855). (Fig. 7)

D. gardneri Benth. in Miq., Pl. Jungh.: 226 (1852) [Type: Ceylon. Walker (K lecto.)]; Miq., Fl. Ned. Ind. **1**(1): 255 (1855).

D. laxum DC. subsp. *leptopus* (A. Gray ex Benth.) H. Ohashi in Ginkgoana **1**: 141 (1973); Verdc., Man. New Guinea Leg.: 402 (1979).

Podocarpium leptopus (A. Gray ex Benth.) Y. C. Yang & P. H. Huang in Bull. Bot. Lab. N. E. Forest. Inst., Harbin **4**: 6 (1979), nom. illegit.

Desmodium tashiroi Matsum. in Ito & Matsum., J. Coll. Sci. Imp. Univ. Tokyo **12** (Tent. Fl. Lutchu.): 415 (1899) [Type: Ryukyu: insula Okinawa. Y. Tashiro anno 1887 (TI holo.)].

D. laxum auct. non DC.: Ridl., Fl. Malay Penins. **1**: 608 (1922).

Distr.: Indo-China, **Malesia**, S. China, Taiwan, and S. Japan.

Specimens examined: **Borneo**. M. S. Clemens 10901 (A). Sarawak. Proposed G. Murud National Park, 4th Division, mixed Dipterocarp forest at 1200 m. Y. P. Ching S-44685 (K). **Jawa**. Zollinger 2537 (BM), Kostermans 161 (A, BO, K, L); Bakh. v/d. Brink 4386 (K, L); N.Wirawan 114 (BO, K, L). Bali. Soenda. Steenis 8086 (L). **Lesser Sunda Is**. Sumbawa. Mt. Batulanteh, moist *Dipterocarpus retusus* forest, 500–700 m alt. Kostermans 18759 (BO, K, L), Kostermans 18395 (L). **Malaya**. Pahang. Ridley s. n. (BM, SING). Selangor. Ridley s. n. (SING); Burkill 8851 (SING). Perak. Henderson 10821 (SING). **Maluku**. Rornassi 1467 (L); Buru. Mogea & Ismail 5203 (BO, K), Mogea 5404 (BO, K), Nooteboom 5117 (BO), van Balgooy 4783 (K, L). **New Guinea**. D.

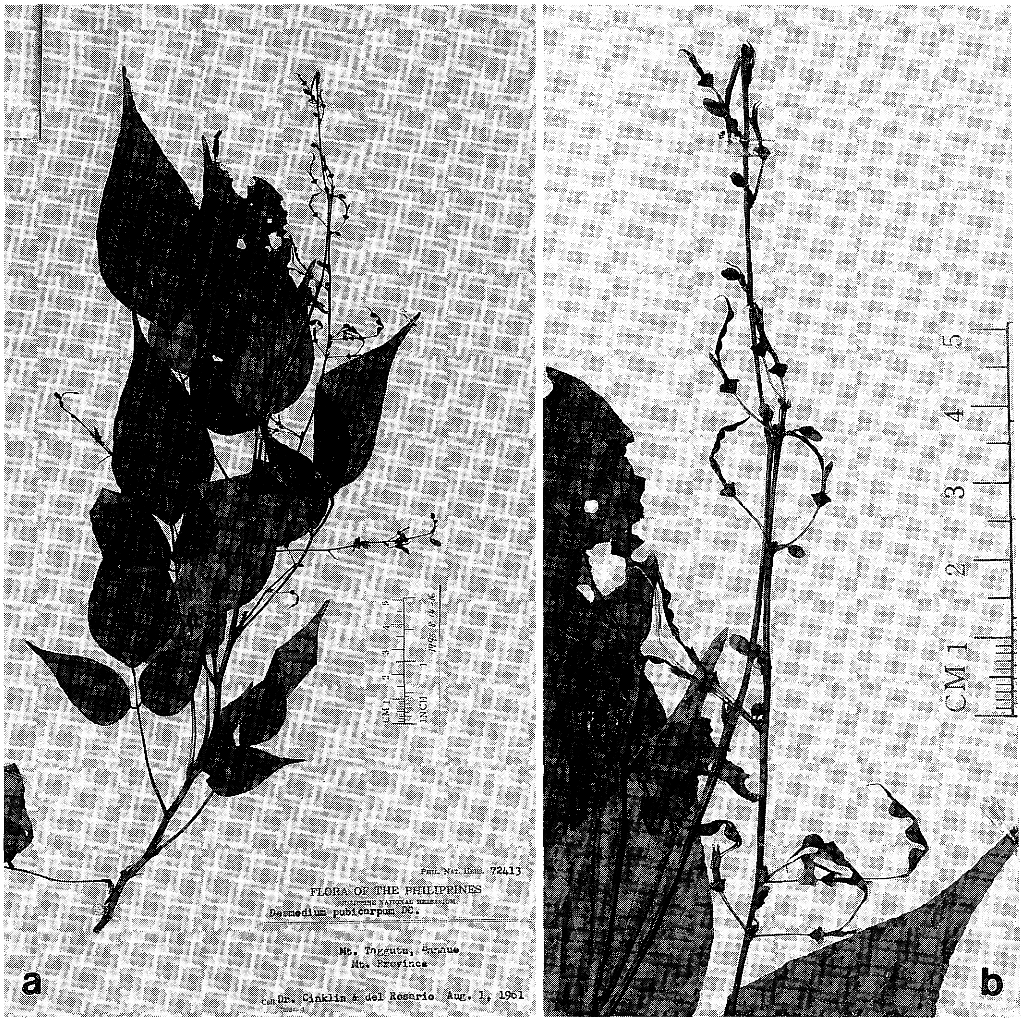

Fig. 6. *Hylodesmum laxum* (DC.) H. Ohashi & R. R. Mill subsp. *laxum*. a: Philippines. Luzon. Dr. Cinklin & del Rosario PNH72413 (A). b: Inflorescence showing characteristic long stipe in young loments (enlarged from fig. a).

Sayers NGF 24245 (A). **Philippines**. Luzon. Exped. Explor. Americanas. (K lecto.; isolecto. GH, US); Angilog, alt. 1200 m. A. Loher 5916 (K); Biliran. R. C. McGregor Bur. Sci. 18729 (K); Camiguin Is. E. Fenix Bur.Sci.4132 (K); Catanduanes. Ramos & Edano Bur.Sci.75287 (NY, UC); Leyte. Frohne PNH 35687 (L, PNH). **Sulawesi**. Yusuf & Wahyono 78 (BO, L). **Sumatera**. R. S. Boeea 10676 (A, L); Lampung. M. Jacobs 8163 (K).

Hylodesmum laxum and *H. leptopus* are found in New Guinea, but the latter appears to be rare.

Hylodesmum podocarpum (DC.) H. Ohashi & R. R. Mill in Edinb. J. Bot. **57**: 181 (2000).

Desmodium podocarpum DC. in Ann. Sci. Nat. (Paris) **4**: 102 (1825) [Type: Nepal.

Wallich (G-DC)]; Merr. in Philipp. J. Sci., C. **5**: 83 (1910) & Enum. Philipp. Flow. Pl. **2**: 287 (1923); H. Ohashi in Ginkgoana **1**: 142 (1973).

Hedysarum podocarpum (DC.) Spreng., Syst. Veg. **3**: 317 (1826).

Podocarpium podocarpum (DC.) Y. C. Yang & P. H. Huang in Bull. Bot. Lab. N.E. Forest. Inst., Harbin **4**: 7 (1979), nom. illegit.

Key to the subspecies of *Hylodesmum podocarpum*

1. Terminal leaflets broadly obovate to orbicular, broadest at or above the middle, apex rounded with an acute tip ....subsp. *podocarpum*
1. Terminal leaflets elliptic-ovate, broadest below the middle, apex acute to acuminate ....subsp. *oxyphyllum*

subsp. **podocarpum**: H. Ohashi & R. R. Mill in Edinb. J. Bot. **57**: 181 (2000).

Desmodium podocarpum DC. subsp. *podocarpum*: H. Ohashi in Ginkgoana **1**: 154 (1973); Huang & H. Ohashi in Fl. Taiwan ed. 2, **3**: 262, t. 126 (1993).

D. racemosum auct. non (Thunb.) DC.: Meeuwen in Reinwardtia **6**: 257 (1962), p. p., incl. syn. *D. podocarpum*.

Distr. (subsp. *podocarpum*): India, Nepal, **Malesia** (Philippines: Luzon, rare), China, Taiwan (rare), Japan and Korea.

Specimens examined: **Philippines**. N. Luzon. Prov. Benguet: Mt. Santo Tomas. 4 ft. high, flowers greenish purple. 12 Oct. 1904. Williams 1398 (NY); Bagino to Ambuklao, Prov. Benguet. Merrill 4356 (NY); Mountain Prov., Bauko Town, above Kamatagan. 16°56′N. 120°54′E, alt. ca. 1450 m. T. Nemoto & al. 10750 (TUS).

Distribution of *Hylodesmum podocarpum* (DC.) H. Ohashi & R. R. Mill subsp. *podocarpum* is confined to Luzon. Occurrence of the species was, however, uncertain in the Philippines. Specimens kept as *D. podocarpum* DC. from the Philippines so far as I have examined are all referable to *H. repandum* (Vahl) H. Ohashi & R. R. Mill, i. e., Mt. Santo Tomas in Benguet Ramos & Edano Bur. Sci. 45098 (K, NY, SING, US), and loc. cit. Merrill 11655 (SING, US). Merrill (1910) reported *Desmodium podocarpum* DC. from Luzon based on two specimens, i. e., Williams 1398 and Merrill 4356, although Merrill 4356 in K and NY (Fig. 8) was erroneously determined by him as *D. scalpe* DC., a synonym of *H. repandum*. These two specimens are without doubt *H. podocarpum* subsp. *podocarpum*. The occurrence of the species was confirmed in the Philippines by our recent collection, Nemoto & al. 10750 (TUS).

Meeuwen (1962) recorded *Desmodium racemosum* (Thunb.) DC. from the Philippines based on Saran & Party 30147. I could not find this specimen in L and other herbaria. A specimen, Dr. Cinklin & del Rosario Phil. Nat. Herb.72413 (L), was determined by Meeuwen as *D. racemosum*. This specimen (as *D. podocarpum*) is kept in several herbaria, but all are *Hylodesmum laxum* (DC.) H. Ohashi & R. R. Mill subsp. *laxum* (Fig. 6). Meeuwen (1962) included *D. podocarpum* DC., *D. gardneri* Benth. and *D. fallax* Schindl. in her *D. racemosum* as synonyms. She circumscribed *D. racemosum* most broadly. Excepting *Desmodium gardneri*, other three species she regarded as conspecific are distinguished as subspecies of *Hylodesmum podocarpum* (DC.) H. Ohashi & R. R. Mill, i. e., subsp. *fallax* (Schindl.) H. Ohashi & R. R. Mill, subsp. *oxyphyllum* (DC.) H. Ohashi & R. R. Mill (= typical *D. racemosum*), and subsp. *podocarpum*. *Desmodium gardneri* comprises *H. laxum* and *H. leptopus* (A.Gray ex Benth.) H. Ohashi & R. R. Mill.

subsp. **oxyphyllum** (DC.) H. Ohashi & R. R. Mill in Edinb. J. Bot. **57**: 182 (2000).

Hedysarum racemosum Thunb. in Murray, Syst. Veg. ed. **14**: 675 (May 1784) & Thunb., Fl. Jap.: 285 (Aug. 1784) [Type: Japan. Thunberg (UPS)], non Aubl. (1755).

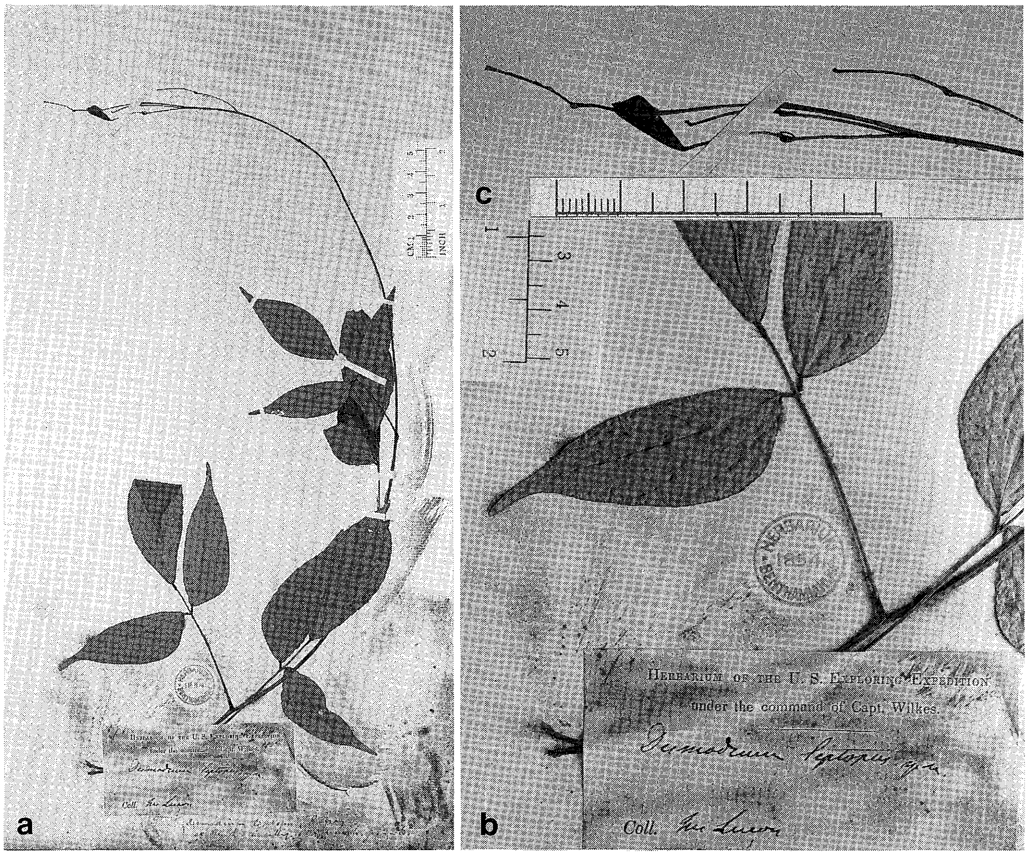
c
a
b
HERBARIUM OF THE U. S. EXPLORING EXPEDITION
under the command of Capt. Wilkes.
Desmodium leptopus
Coll.

Fig. 7. *Hylodesmum leptopus* (A.Gray ex Benth.) H. Ohashi & R. R. Mill. a: Philippines. Luzon. Lectotype (K). b: Part of the lectotype with label (enlarged from fig. a). c: Loment (enlarged from fig. a).

Desmodium oxyphyllum DC. in Ann. Sci. Nat. (Paris) **4**: 102 (Jan. 1825) [Type: Nepal. Wallich (G-DC)].

D. racemosum (Thunb.) DC., Prodr. **2**: 337 (Nov. 1825), nom. illegit.; Meeuwen in Reinwardtia **6**: 257 (1962), p. p., excl. syn. cit. *D. podocarpum*, *D. gardneri*, et *D. fallax*.

D. japonicum Miq., Ann. Mus. Bot. Lugduno-Batavi **3**: 46 (1867), p. p.

D. oxyphyllum DC. var. *japonicum* Matsum. in J. Coll. Sci. Imp. Univ. Tokyo **12** (Tent. Fl. Lutchu.): 415 (1899) [Type: Japan. "insula Oshima". ix 1887. Y. Tashiro s. n. (TI holo.)].

D. racemosum (Thunb.) DC. var. *pubescens* F. P. Metcalf in Lingnan Sci. J. **19**: 605 (1940) [Type: China. "Fukien. near Chekiang border, 600–1200 m. viii 1924. Ching 2513 (US holo.)].

D. podocarpum DC. subsp. *oxyphyllum* (DC.) H. Ohashi in H. Hara, Fl. E. Himal. **2**: 65 (1971) & in Ginkgoana **1**: 150 (1973).

Podocarpium podocarpum (DC.) Y. C. Yang & P. H. Huang var. *oxyphyllum* (DC.) Y. C. Yang & P. H. Huang in Bull. Bot. Lab. N.E. Forest. Inst., Harbin **4**: 9 (1979), nom. illegit.

P. podocarpum var. *japonicum* (Matsum.) P. H. Huang in Bull. Bot. Res., Harbin **18**: 6

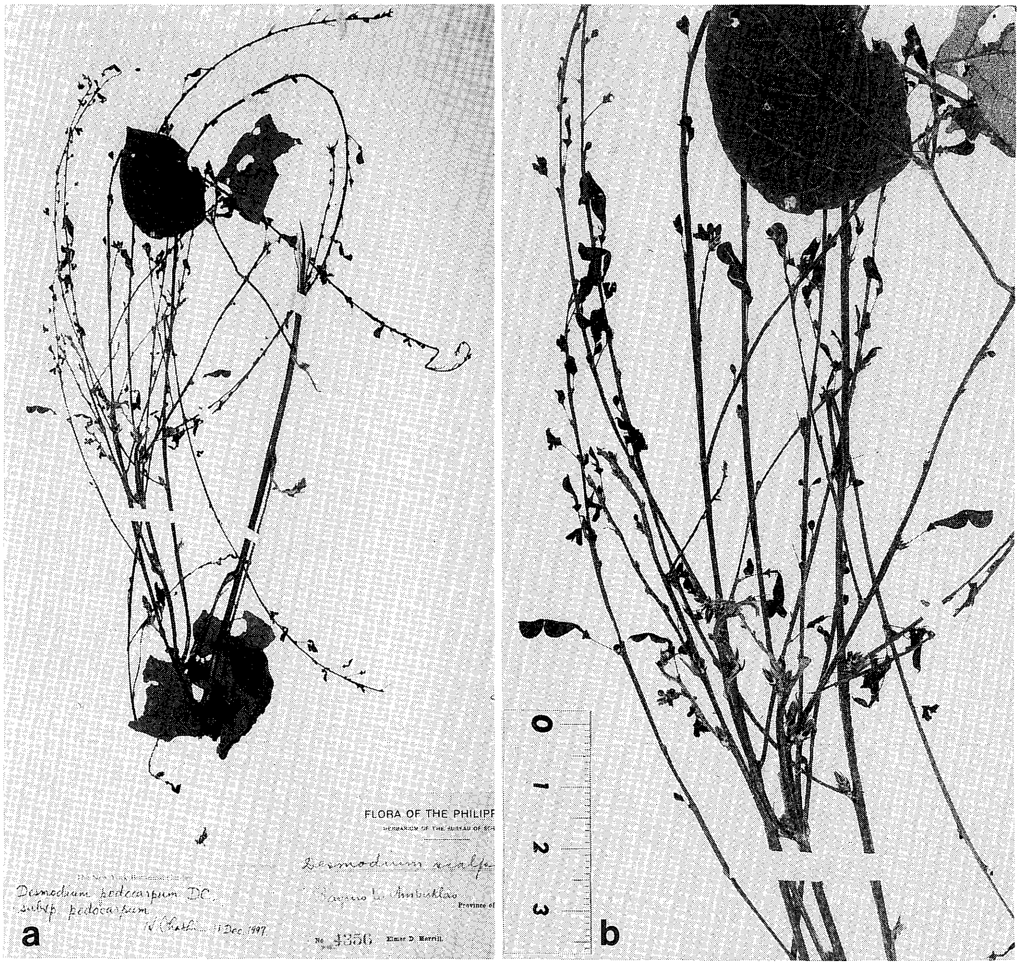

Fig. 8. *Hylodesmum podocarpum* (DC.) H. Ohashi & R. R. Mill subsp. *podocarpum*. a: Philippines. Luzon. Merrill 4356 (NY). b: Loments (enlarged from fig. a).

(1998), nom. illegit.

Distr. (subsp. *oxyphyllum*): India, Nepal, Sikkim, Bhutan, Myanmar, Laos, Vietnam, China, Taiwan, Japan, Korea, and Russian Far East. Probably erroneous from **Malesia** (Jawa).

Specimen examined: **Jawa**. Zollinger 1905, p. p. (A).

The specimen, Zollinger 1905 cited above, is labeled as "planta Javanica a cl. Zollingero lecta", but is composed of two plants; *Ohwia caudata* (Thunb.) H. Ohashi and *Hylodesmum podocarpum* subsp. *oxyphyllum* (DC.) H. Ohashi & R. R. Mill. The two taxa are mounted on the same herbarium sheet in A. A duplicate specimen of Zollinger 1905 is kept in BM, but this composes purely *O. caudata*. *Hylodesmum podocarpum* subsp. *oxyphyllum* mounted on the sheet in A may be erroneously mixed in Zollinger 1905. This specimen must be brought from outside of Jawa, because *H. podocarpum* subsp. *oxyphyllum* has not been known in Jawa.

A specimen, Lörzing 11737 (BO) from

North Sumatera, is named *Desmodium oxyphyllum* (= *Hylodesmum podocarpum* subsp. *oxyphyllum*), but is *D. elegans* DC. This specimen was collected from a cultivated plant and *D. elegans* is not indigenous in Malesia.

Hylodesmum repandum (Vahl) H. Ohashi & R. R. Mill in Edinb. J. Bot. **57**: 185 (2000).

Hedysarum repandum Vahl, Symb. Bot. **2**: 82 (1791) [Type: Yemen. 1763. Forsskal (holo. C-Vahl)].

Aeschinomene remota Poir. in Lam., Encyc. **4**: 452 (1798).

Desmodium repandum (Vahl) DC., Prodr. **2**: 334 (1825); Meeuwen in Reinwardtia **6**: 258 (1962); Backer & Bakh. f., Fl. Java **1**: 604 (1963); H. Ohashi in Ginkgoana **1**: 160 (1973); Verdc., Man. New Guinea Leg.: 404 (1979).

D. scalpe DC., Prodr. **2**: 334 (1825) [Type: Mauritius. "in insula Borbonia et forsan Madagascar" (G-DC: two specimens, both apparently from Mauritius)]; Ridl., Fl. Malay Penins. **1**: 608 (1922); Merr., Enum. Philipp. Flow. Pl. **2**: 289 (1923).

D. strangulatum Wight & Arn., Prodr. Fl. Ind. Orient.: 228 (1834) [Type: Peninsula Ind. orientalis. Wight 774 (K lecto.; isolecto. E)].

D. caffrum Eckl. & Zeyh., Enum. Pl. Afric. Austral. 251 (Jan. 1836) [Type: South Africa. "In locis humidis in hiatu montis sylvoso ad flumen 'Makasanirivier' (Kafferland), Maio". Ecklon & Zeyher (MEL? holo.; iso. K)].

D. schimperi Hochst. ex A. Rich., Tent. Fl. Abyss. **1**: 205 (1847).

Papilionopsis stylidioides Steenis in Nova Guinea, Bot. **3**: 17 (1960) [Type: The apical part of an inflorescence of *Hylodesmum repandum* (Fabaceae), D. Bergman 287 (S), which also comprises foliage, roots and a young scape of *Burmannia disticha* L. (Burmanniaceae)].

Podocarpium repandum (Vahl) Y. C. Yang & P. H. Huang in Bull. Bot. Lab. N.E. Forest. Inst., Harbin **4**: 13 (1979), nom. illegit.

Distr.: Africa and Asia. Asia: North Yemen, Sri Lanka, India, Myanmar, Thailand, Indo-China, **Malesia**, and China (Yunnan). No records from Australia.

Specimens examined: **Borneo**. Mt. Kinabalu. M. Togashi s. n. 16.9.1966 (TI), Upper Kinabalu. J. & M. S. Clemens 34170 (BM, NY). **Jawa**. Backer 9558 (K); Blume (NY); O. Kuntze 24.5.75 (NY). **Lesser Sunda Is**. Lombok. Elbert 837 (K). Timor. Forbes 3496 (BM). **Malaya**. Pahang. Ridley 13553 (BM). **Maluku**. Mittel-Ceram. E. Stresemann 99 (L). **New Guinea**. Brass 4141 (NY); Morobe Prov.: Bulldong Road, alt. 2650 m, montane forest. M. Fallen 519 (L); Star Mts., Sibil-valley, riverside. C. Kalkman 4046 (L). **Philippines**: Luzon: Prov. Benguet. Merrill 4330 (K, L, NY). Mindanao. Mt. Katanglad. M. D. Sulit PNH10019 (L). **Sulawesi**. Johansson & al. 308 (K); **Sumatera.** W. & C. Bangham (K); East Coast. Yates 1401 (NY).

Hylodesmum repandum is often very similar to *H. podocarpum* subsp. *podocarpum* especially in leaflets and loments. Sometimes both were misidentified each other as noted under the latter.

Verdcourt (1979) doubted the indigenous status of *Hylodesmum repandum* (as *Desmodium repandum*) in New Guinea. Distribution pattern of this species differs entirely from those of other members of the genus.

MONARTHROCARPUS

Monarthrocarpus Merr. in Philipp. J. Sci., C. **5**: 88 (1910) [Type: *Monarthrocarpus securiforme* (Benth.) Merr. (= *Desmodium securiforme* Benth.)]; Hutch., Gen. Fl. Pl. **1**: 480 (1964).

Desmofischera Holthuis in Blumea **5**: 188 (1942) [Type: *Desmofischera monosperma* Holthuis].

Desmodium subgen. *Podocarpium* sect. *Monarthrocarpus* (Merr.) H. Ohashi, Ginkgoana **1**: 125 (1973).

Monarthrocarpus Merr. is distinct from

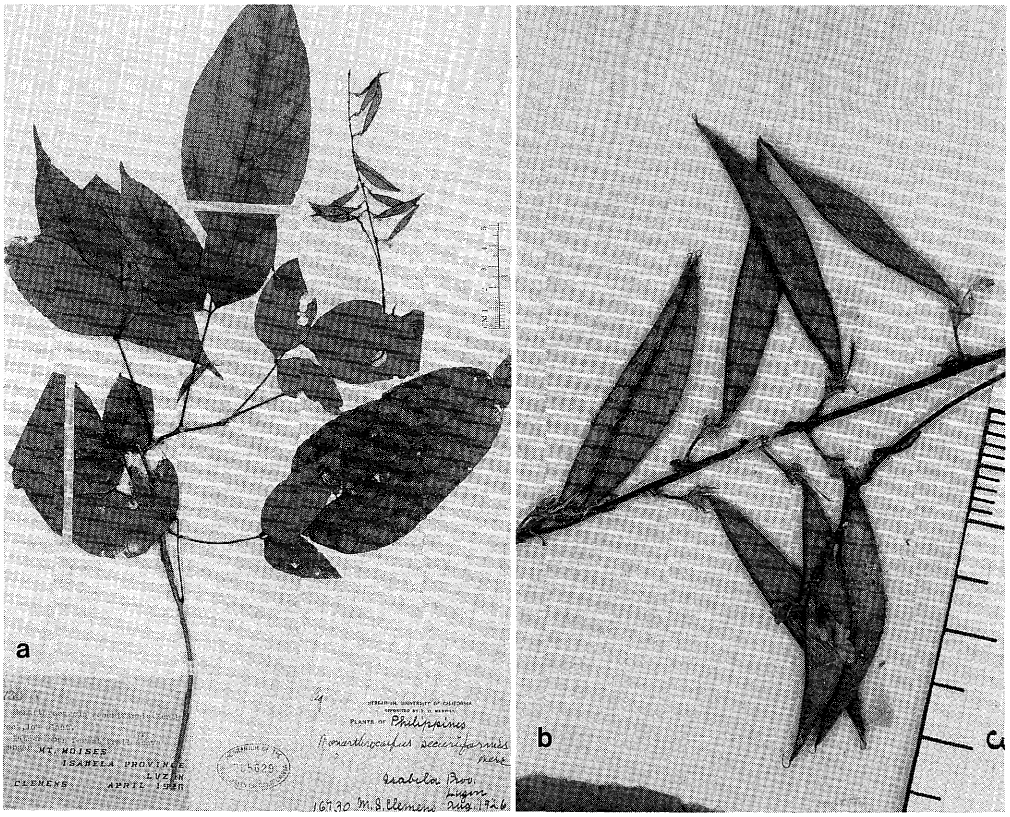
a
MT. MOISES
ISABELA PROVINCE
LUZON
CLEMENS APRIL 1926
HERBARIUM, UNIVERSITY OF CALIFORNIA
PLANTS OF Philippines
Monarthrocarpus securiformis Merr.
Isabela Prov. Luzon
16730 M.S. Clemens Aug. 1926
b

Fig. 9. *Monarthrocarpus securiforme* (Benth.) Merr. a: Philippines. Luzon. Clemens 16730 (UC). Reproduced from Ginkgoana **1**, pl. 15a (1973). b: Infructescence (enlarged from fig. a).

Desmodium in having falcate, 1-seeded loments, scarcely rim-arillate, flat seeds, and diadelphous stamens, although it was included in *Desmodium* subgenus Podocarpium (Ohashi 1973).

The genus is monotypic.

Monarthrocarpus securiforme (Benth.) Merr. in Philipp. J. Sci., C. **5**: 88 (1910) & Enum. Philipp. Flow. Pl. **2**: 291 (1923). (Fig. 9).

Desmodium securiforme Benth. in Miq., Pl. Jungh.: 226 (1852) [Type: Philippines. Luzon. Cuming 576 (K holo.; iso. BM, K)]; Miq., Fl. Ned. Ind. **1**(1): 255 (1855); Meeuwen in Reinwardtia **6**: 258 (1962); H. Ohashi in Ginkgoana **1**: 128 (1973); Verdc., Man. New Guinea Leg.: 407 (1979).

Monarthrocarpus securiforme (Benth.) Merr. var. *monophylla* Merr. in Philipp. J. Sci., C. **5**: 90 (1910) [Type: Philippines. Mindanao, District of Davao, Catalonan. Copeland 937. Apr. 1904. in forests, altitude 125 m (herb. ?)] & Enum. Philipp. Fl. Pl. **2**: 291 (1923).

Desmofischera monosperma Holthuis in Blumea **5**: 189, fig. 5 (1942) [Type: Taland isl., Karakelong, O. v. Beo. 26 Apr. 1926. H. J. Lam 2637 (L holo.; iso. BO)].

Distr.: Endemic to Malesia: Maluku, New Guinea, Philippines, and Sulawesi.

Specimens examined: **Maluku**: Mt. Permatang 500

m. Kostermans 958 (A, BO, K, L) Mt. Permatang, along Sabgawi river, alt. 200 m. Kostermans 908 (L) Mt. Totodohoe 30 m. Kostermans 761 & 1455 (L); Morotai. Kostermans 7856 (L); Morotai. H. J. Lam 3645 (L); Mortai. Lam 3681 (K); Halmahera Island. Taylor P-319 (A); Maluku. Yoshida 2429 (L); Obi Isl. Anggai, alt. 200 m. E.F. de Vogel 4195 (L). **New Guinea**: Misool. near Waima. Shrub, 1 m high, fls white. D. R. Pleyta 1046 (A, K, L); Mori River, Abau sub-district, Papua, alt. 50 m. Sayers NGF19660 (L); Usino, alt. 400 ft. Henty NGF28020 (L); Sorong, alt. 20 m. Plezte 629 (L). **Philippines**: Luzon. Cuming 576 (K holo.; iso. BM, K), Irosin. Elmer 15907 (NY, TI), Isabela, Calamangan–Mariano. M.S. Clemens 16729 (UC); Isabela Prov., rather open forest trail above Calamangan, Mt. Moises. Aug. 1926. M. S. Clemens 16730 (UC). **Sulawesi**. Taland isl., Karakelong. Clealed old folest, rather frequent, alt. 90 m. Small undershrub, partly prostrate, colorlla and filaments white, fr. green. Lam 2637 (L, BO types); Taland isl. Salebabae, top G. Ajambana. 20 May 1926. H. J. Lam 3057 (L); weg Oedjoeng Lamoeroe–Takalala. C. Monod de Froideville 421 (L).

OHWIA

Ohwia H. Ohashi in Sci. Rep. Tohoku Univ. ser. 4, Biol. **40**: 243 (1999) [Type: *Ohwia caudata* (Thunb.) H. Ohashi (= *Hedysarum caudatum* Thunb.)].

Catenaria Benth. in Miq., Pl. Jungh.: 217 & 220 (1852) [Type: *Catenaria laburnifolia* (Poir.) Benth. (*Hedysarum laburnifolium* Poir.)], non Roussel, Fl. Calvados ed. 2: 85 (1806), nec. Sternberg, Versuch Fl. Vorwelt 1 (Tentamen): **25**: t. 52, f. 1 (1825); Schindl. in Repert. Spec. Nov. Regni Veg. **20**: 275 (1924); Hutch., Gen. Fl. Pl. **1**: 480 (1964).

Desmodium sect. *Catenaria* (Benth.) Benth. in Benth. & Hook. f., Gen. Pl. **1**: 520 (1865); Taub. in Engler & Prantl, Nat. Pflanzenfam. III, **3**: 328 (1894).

Desmodium subgen. *Catenaria* (Benth.) Baker in Hook. f., Fl. Brit. Ind. **2**: 163 (1876); H. Ohashi in Ginkgoana **1**: 91 (1973).

Ohwia H. Ohashi is named instead of *Catenaria* (Ohashi 1999). *Catenaria* was created by Bentham (1852) and maintained by Schindler (1924b) and Hutchinson (1964), but it has been widely recognized as a member of *Desmodium*. Although *O. caudata* has remarkable characters in common with *Desmodium*, i. e., jointed pods with hooked hairs, the differences between *Ohwia* and *Desmodium* are described by Ohashi (1973) for *D. caudatum* in morphological and palynological characters. It is revived to a genus *Ohwia*, because it is distinct from *Desmodium* in having a disk around the base of the pistil and seeds with a scarcely developed hilum lacking a rim-aril. Moreover, *Ohwia* differs from most of *Desmodium* in having distinctly veined chartaceous petals (against slightly veined membranaceous petals in most of *Desmodium*), equally indented linear pods and coarsely reticulate pollen grains (Ohashi 1999).

The genus comprises two species of which one is found in Malesia.

Ohwia caudata (Thunb.) H. Ohashi in Sci. Rep. Tohoku Univ. ser. 4, Biol. **40**: 243 (1999); H. Ohashi in K. Iwats. & al., Fl. Jap. **IIb**: 254 (2001); Kumar & Sane, Leg. S. Asia: 212 (2003).

Hedysarum caudatum Thunb. in Murray, Syst. Veg. ed. 14, 675 (1784); Thunb., Fl. Jap.: 286 (1784) [Type: Japan. Thunberg (UPS)].

H. laburnifolium Poir. in Lam., Encycl. **6**: 422 (1805) [Type: from Java. (P), n. v.].

Desmodium caudatum (Thunb.) DC., Prodr. **2**: 337 (1825); Meeuwen in Reinwardtia **6**: 248 (1962); Backer & Bakh. f., Fl. Java **1**: 605 (1963); Ohwi, Fl. Jap.: ed. Engl.: 561 (1965); H. Ohashi in Ginkgoana **1**: 91 (1973); Huang & H. Ohashi in Fl. Taiwan **3**: 256, pl. 572 (1977); H. Ohashi in Enum Fl. Pl. Nepal **2**: 115 (1979); Grierson & Long, Fl. Bhutan **1**(3): 677 (1987); Sanjappa, Leg. India: 150 (1992); Huang & H. Ohashi in Fl. Taiwan ed. 2, **3**: 252 (1993); H. Ohashi in Dy Phon & al., Fl. Camb. Laos Vietn. **27**: 78 (1994); Yang & Huang in Fl.

Reipubl. Popul. Sin. **41**: 19 (1995); Pedley, Rev. Hand. Fl. Ceylon **10**: 175 (1996).

D. laburnifolium (Poir.) DC., Prodr. **2**: 337 (1825); Ridl., Fl. Malay Penins. **1**: 608 (1922).

Catenaria laburnifolia (Poir.) Benth. in Miq., Pl. Jungh.: 220 (1852); Miq., Fl. Ned. Ind. **1**(1): 257 (1855).

C. caudata (Thunb.) Schindl. in Repert. Spec. Nov. Regni Veg. **20**: 275 (1924); Hutch., Gen. Fl. Pl. **1**: 480 (1964).

Distr.: Sri Lanka, E. India, Myanmar, Indo-China, **Malesia**, China, Taiwan, and Japan.

Specimens examined: **Jawa**. Reinwardt (L); Zollinger 1905 (BM; A, p. p., excl. *Desmodium podocarpum* subsp. *oxyphyllum*), Junghuhn 169 (K, L), Backer 2363 (K, L); Tjisaroea-South (WNW slope of Mt. Gede), alt. 1200 m, in moist forest. S. J. van Ooststroom 12737 (PNH). Many specimens collected in Jawa are kept in BO. **Malaya**. Peninsula Malaysia. Johor. Ridley 15434 (BM). **Sumatera**. Atjeh, in dense evergeen forest. Iwatsuki & al. 812 (BO, KYO, L); near Lake Tawar. Bangham 803 (A, K); Korinchi. Robinson & Kloss 20 (BM).

PHYLLODIUM

Phyllodium Desv., J. Bot. Agric. **1**: 123, tab. 5, fig. 24 (1813), excl. *Phyllodium lutescens* Desv. [Type: *Phyllodium pulchellum* (L.) Desv. (= *Hedysarum pulchellum* L.)]; H. Ohashi in Ginkgoana **1**: 260 (1973); H. Ohashi & al., Adv. Leg. Syst. **1**: 299 (1981); Allen & Allen, Leg.: 516 (1981); Huang & H. Ohashi, Fl. Taiwan ed. 2, **3**: 350 (1993); Dy Phon in Dy Phon & al., Fl. Camb. Laos Vietn. **27**: 28 (1994); Y. C. Yang & P. H. Huang in Fl. Reipubl. Pop. Sin. **41**: 8 (1995); Pedley, Rev. Hand. Fl. Ceylon **10**: 164 (1996); H. Ohashi in Sci. Rep. Tohoku Univ. ser. 4, Biol. **40**: 245 (1999); Pedley in Austrobaileya **5**: 255 (1999).

Desmodium sect. *Phyllodium* (Desv.) Benth. in Benth. & Hook. f., Gen. Pl. **1**: 519 (1865).

Desmodium subgen. *Phyllodium* (Desv.) Baker in Hook. f., Fl. Brit. Ind. **2**: 162 (1876).

The genus comprises eight species of which two are found in Malesia.

Key to the species of *Phyllodium* in Malesia

1. Lateral leaflets similar to the terminal one and distinct from primary bracts; flowers more than 10 mm long .... *P. vestitum*
1. Lateral leaflets smaller (ca. 2 times) than the terminal one and similar to primary bracts; flowers less than 7 mm long 2
2. Pods usually 2-jointed, sparsely pubescent on lateral surfaces, reticulate-veined; stipules narrowly triangular, 6–8 mm long. Lowest calyx-lobe almost equal to the lateral one. Bracteal leaflets uniformly appressed pubescent on nerves on adaxial surfaces .... *P. pulchellum*
2. Pods usually 3–4-jointed; stipules broadly triangular, 3–5 mm long. Lowest calyx-lobe longer than the lateral one. Bracteal leaflets densely hairy on nerves on adaxial surface .... *P. elegans*

Phyllodium elegans (Lour.) Desv. in Mém. Soc. Linn. Paris **4**: 324 (1825) [Type: China. Canton–Macao (Gaudichaud 147 P neo. designated by Dy Phon in Fl. Camb. Laos Vietn. **27**: 38, 1994)]; H. Ohashi in Ginkgoana **1**: 269 (1973); Dy Phon in Dy Phon & al., Fl. Camb. Laos Vietn. **27**: 37 (1994).

var. **javanicum** Schindl. in Repert. Spec. Nov. Regni Veg. **20**: 270 (1924) [Syntypes: e Java & Madura. (BO, CAL, etc.)]; H. Ohashi in J. Jpn. Bot. **72**: 350 (1997).

Phyllodium vestitum Miq., non DC., Fl. Ned. Ind. **1**(1): 261 (1855), excl. syn. cit.

Desmodium blandum van Meeuwen in Reinwardtia **6**: 247 (1962), p. p., incl. specim. e Jawa; Backer & Bakh. f., Fl. Java **1**: 603 (1963), ut *D. blandum* Knaap.

Distr. (var. *javanicum*): **Malesia** (Jawa) and Thailand.

Specimins examined: **Jawa**. Teyjesmann 1868 (K, NY), Backer s. n. July 1904 (K, L), Miquel s. n. (K), Horsfield 60 (BM) & Horsfield 81 (GH, K, L), Horsfield 585 (K), Junghuhin 117 (K), Winterbottom s. n. July 1846 (K), Waitz s. n. (L); Tjisaroa. Möler on 17/4 1897 (A).

Phyllodium elegans var. *javanicum* is distinguished from var. *elegans* by its grayish hairy leaves, broadly ovate terminal leaflet with rounded base and distinct lateral and third (between lateral nerves) nerves, wrinkled primary leafy bracts with conspicuous third nerves and 4–5 mm long fruiting pedicels.

Phyllodium elegans var. *elegans* is not found in Malesia, and is confined to Thailand, Indo-China and S. China (Ohashi 1997c).

Phyllodium pulchellum (L.) Desv., J. Bot. Agric. **1**: 124 (1813) & in Mem. Soc. Linn. Paris **4**: 324 (1825); Benth. in Miq., Pl. Jungh.: 217 (1852); H. Ohashi in Ginkgoana **1**: 276 (1973); Dy Phon in Dy Phon & al., Fl. Camb. Laos Vietn. **27**: 40 (1994); Pedley in Austrobaileya **5**: 257 (1999).

Hedysarum pulchellum L., Sp. Pl.: 747 (1753) [Type: Herb. Linn. No. 921.24 (LINN dlecto., see Pedley in Turland & Jarvis 1997)].

Dicerma pulchellum (L.) DC. in Ann. Sci. Nat. (Paris) **4**: 236 (1825) & in Prodr. **2**: 239 (1825) & Mem. Leg.: 328 (1826).

Desmodium pulchellum (L.) Benth., Fl. Hongkong.: 83 (1861); Ridl., Fl. Malay Penins. **1**: 607 (1922); Merr. in Philipp. J. Sci., C. **5**: 79 (1910) & Enum. Philipp. Flow. Pl. **2**: 288 (1923); Meeuwen in Reinwardtia **6**: 276 (1962); Backer & Bakh. f., Fl. Java **1**: 603 (1963); Verdc., Man. New Guinea Leg.: 404 (1979).

Distr.: Asia, Australia and Pacific (Solomon Is.). Asia: Sri Lanka, India, Myanmar, Thailand, Indo-China, **Malesia** (throughout), China, Taiwan, and S. Japan (Ryukyus).

Phyllodium vestitum Benth. in Miq., Pl. Jungh.: 217 (1852) [Type: "*Dicerma vestitum* Wall., Numer. List n. 5739. In Moulmega" (K-W)]; Ohashi in Ginkgoana **1**: 279 (1973); Dy Phon in Dy Phon & al., Fl. Camb. Laos Vietn. **27**: 34 (1994).

Desmodium vestitum (Benth.) Benth. ex Baker in Hook. f., Fl. Birt. Ind. **2**: 162 (1876); Ridl., Fl. Malay Penins. **1**: 607 (1922).

Distr.: Myanmar, Thailand, Indo-China, and **Malesia**.

Specimen examined: **Malaya**. Peninsula Malaysia. Kehah. Rawei island. Ridley 15980 (BM).

TADEHAGI

Tadehagi H. Ohashi, Ginkgoana **1**: 280 (1973), p. p., excl. subgen. Godefroya (Schindl.) H. Ohashi [Type: *Tadehagi triquetrum* (L.) H. Ohashi (= *Hedysarum triquetrum* L.)] & in J. Jpn. Bot. **78**: 276 (2003).

The genus comprises six species of which one is found in Malesia. Merrill (1923) recorded *Tadehagi auriculatum* (DC.) H. Ohashi (as *Desmodium auriculatum* DC.) from Luzon, but it was misidentification of *T. triquetrum* (L.) H. Ohashi nothosubsp. *philippinense* H. Ohashi var. *philippinense* H. Ohashi.

Tadehagi triquetrum (L.) H. Ohashi in Ginkgoana **1**: 290 (1973), p. p., incl. subspp. *triquetrum* & *pseudotriquetrum*, cet excl. & in J. Jpn. Bot. **78**: 284 (2003).

Hedysarum triquetrum L., Sp. Pl.: 746 (1753) [Type: Herb. Hermann **3**: 39 & **4**: 18 (BM), fide Pedley 1996].

Key to the subspecies and their hybrids of *Tadehagi triquetrum*

1. Loments densely to sparsely pubescent on lateral surfaces 2
1. Loments glabrous on lateral surfaces 3
2. Leaf-blade usually more than 3 times longer than broad, linear to narrowly ob-

long-ovate or narrowly ovate..................
..................................subsp. *triquetrum*

2. Leaf-blade less than 3 times longer than broad, usually ovate or narrowly ovate.....
.......................nothosubsp. *philippinense*
var. *palawanense*
3. Leaf-blade less than 3 times longer than broad, usually ovate or narrowly ovate.....
..........................subsp. *pseudotriquetrum*
3. Leaf-blade usually more than 3 times longer than broad, linear to narrowly oblong-ovate or narrowly ovate....................
........................nothosubsp. *philippinense*
.....................................var. *philippinense*

subsp. **triquetrum**: H. Ohashi in Ginkgoana **1**: 296, pl. 42a (1973) & in J. Jpn. Bot. **78**: 286, figs. 8–9 (2003).

Desmodium triquetrum (L.) DC., Prodr. **2**: 326 (1825); Prain in J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. **66**: 390 (1897), ut subsp. *genuina* Prain; Ridl., Fl. Malay Penins. **1**: 611 (1922); Merr., Enum. Philipp. Flow. Pl. 2: 290 (1923); Meeuwen in Reinwardtia **6**: 262 (1962), ut subsp. *triquetrum*; Backer & Bakh. f., Fl. Java **1**: 604 (1963); Verdc., Man. New Guinea Leg.: 410 (1979), ut subsp. *triquetrum.*

Pteroloma triquetrum (L.) Desv. ex Benth. in Miq., Pl. Jungh.: 220 (1852).

Distr. (subsp. *triquetrum*): Asia, N. Australia (?), and Pacific. Sri Lanka, India, Bangladesh, Myanmar, Thailand, Indochina, **Malesia** (throughout), S. & SW. China, and Taiwan (rare).

Specimens examined: **Borneo**. About 3 miles from Tamu Darat. In dense bracken and lalang in full sun, by path. Bright pinkish-mauve flowers, no scent. Darnton 78 (BM, L); Kinabalu. J. & M. S. Clemens 26795 (K, L). **Jawa**. Blume (A), Horsfield L66 (K); Timor. Unknown collector (L, G-DC as *Desmodium auriculatum* DC. in Candolle: Prodromi Herbarium, IDC micro-edition sheet no. 381). **Maluku**. Amboina. Robinson 557 (GH, K, US); de Wiljes-Hissink 99 (A). **New Guinea**. Papua. Milne Bay District. Brass 24360 (A, K, L, US); Goragatabu Creek area. Pullen 6766 (A, K, L). **Philippines**. Luzon. Ramos & Edano Bur. Sci. 44688 (A, K, NY, US). **Sulawesi**. Rachmat 24 (L). Sumatera. Bacon 121 (K), Lörzing 13087 (A, BO, K), Yates 2236 (NY).

subsp. **pseudotriquetrum** (DC.) H. Ohashi in Ginkgoana **1**: 295 (1973) in J. Jpn. Bot. **78**: 287, fig. 10 (2003).

Desmodium pseudotriquetrum DC. in Ann. Sci. Nat. (Paris) **4**: 100 (1825) [Type: Nepal. Wallich (G holo., A iso. partly)], & Mém. Lég. 320 (1826); Merr. in Philipp. J. Sci., C. **5** : 87 (1910), Enum. Philipp. Flow. Pl. **2**: 288 (1923), & in Trans. Amer. Phil. Soc. **24**: 201 (1935).

Desmodium triquetrum subsp. *pseudotriquetrum* (DC.) Prain in J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. **66**: 390 (1897): Meeuwen in Reinwardtia **6**: 263 (1962); Verdc., Man. New Guinea Leg.: 410 (1979).

Distr. (subsp. *pseudotriquetrum*): India, Nepal, Bhutan, **Malesia** (rare in New Guinea and Philippines), S. & SW. China, and Taiwan.

Specimens examined: **New Guinea**. Milne Bay District. Brass 24360 (K, L, US). **Philippines**. Luzon. Lepanto. Merrill 4477 (K, NY, US).

nothosubsp. **philippinense** H. Ohashi in J. Jpn. Bot. **78**: 291 (2003), as "*philippinensis*".

=*Tadehagi triquetrum* subsp. *triquetrum* ×*Tadehagi triquetrum* subsp. *pseudotriquetrum* (DC.) H. Ohashi

var. **philippinense** H. Ohashi in J. Jpn. Bot. **78**: 293, figs. 11–12 (2003), as "*philippinensis*".

Pteroloma pseudotriquetrum × ? *triquetrum*: Schindl. in Repert. Spec. Nov. Regni Veg. **20**: 273 (1924).

Desmodium auriculatum auct. non DC.: Merr., Enum. Philipp. Flow. Pl. **2**: 284 (1923).

Distr. **Malesia**. Endemic to the Philippines (Luzon).

Specimens examined: **Philippines**. Luzon. Prov. Rizal, Bosoboso. July 1906. Ramos Bur. Sci. no. 1036 (GH–holotype, NY, US); Prov. Rizal. Ramos Bur. Sci. 22685 (GH); Rizal. Ramos & Edano Bur. Sci. 29494

(K, US); Manila. Vidal 2610 (A, K).

This hybrid has loments glabrous on the lateral surface as subsp. *pseudotriquetrum*. Merrill (1923) determined this hybrid as *Desmodium auriculatum* based on "Ramos B. S. 1036, Ramos B. S. 22685 and Merrill 7394", although I have not examine the last one. See the differences between *Tadehagi auriculatum* and *T. triquetrum* (nothosubsp. *philippinense* var. *philippinense*) in Ohashi in J. Jpn. **78**: 279 (2003).

var. **palawanense** H. Ohashi in J. Jpn. Bot. **78**: 293, fig. 13 (2003), as "*palawanensis*"

Distr. **Malesia**. Philippines and New Guinea.

Specimens examined: **Philippines**. Palawan. Edano 4 Mar. 1951. PNH14138 (A–holotype, L). New Guinea. Fergusson Is. Brass 27226 (A, K, L, US).

This hybrid has loments pubescent on the lateral surface.

TRIFIDACANTHUS

Trifidacanthus Merr. in Philipp. J. Sci., C. **12**: 269 (1917) [Type: *Trifidacanthus unifoliolatus* Merr.]; H. Ohashi & al., Adv. Leg. Syst. **1**: 299 (1981); Dy Phon in Dy Phon & al., Fl. Camb. Laos Vietn. **23**: 94 (1987); Y. C. Yang & P. H. Huang in Fl. Reipubl. Pop. Sin. **41**: 2 (1995).

Trifidacanthus Merr. was first established and placed, by Merrill (1917), close to *Arthroclianthus* Baill. endemic to New Caledonia, but was included in *Desmodium* by Steenis (1982). It was again recognized as distinct from *Desmodium* and was considered one of the genera nearest to *Desmodium* (Ohashi et al. 1996). *Trifidacanthus* is characterized in having lignified trifid spines (derived from an inflorescence axis and two lateral pedicels), the marginal venation pattern of the leaflets, sympodial terminal inflorescences, and loments without hooked hairs.

The genus is monotypic.

Trifidacanthus unifoliolatus Merr. in Philipp. J. Sci., C. **12**: 269 (1917) [Type: Luzon. M. Ramos Bur.Sci. 27196 (K holo.)]; Merr., Enum. Philipp. Flow. Pl. **2**: 292 (1923); H. Ohashi et al. in J. Jpn. Bot. **71**: 63 (1996).

Desmodium horridum Steen. in Blumea **24**: 482 (1978) [Type: Lombok. De Voogd 2130 (L holo.; iso. A, K)] & in Reinwardtia **10**: 24 (1982).

Desmodium unifoliolatum (Merr.) Steen. in Reinwardtia **10**: 24 (1982).

Distr.: **Malesia** (Lesser Sunda Is: Lombok and Flores and the Philippines: Luzon), S. Vietnam and S. China (Hainan).

Specimens examined: **Lesser Sunda** Is. Lombok, Praja. De Voogd 2130 (L holo. of *D. horridum*; iso. K). **Philippines**. Luzon. M. Ramos Bur. Sci. 27196 (K holo. of *T. unifoliolatus*; iso. A); Ilocos Norte. Ramos Bur. Sci. 32925 (BM, NY).

Phytogeographic considerations

1. Distribution of genera in Malesia

The boundary between Malesia and Indo-China floristic regions lies slightly to the north of the political border of Malaysia (Johns 1995). Continental Asia in this paper means an area excluding the southern half of Malay Peninsula. Malesia has much diversity in distribution of organisms. In current phytogeographical studies, Malesia is divided into three floristic regions: Western Malesia (Sunda Shelf) including Borneo, Jawa, southern half of Malay Peninsula, Palawan, and Sumatera, Central Malesia including the Lesser Sunda Islands, Maluku, the Philippines (excluding Palawan), and Sulawesi, and Eastern Malesia or Papuasia including New Guinea and the Bismarck Archipelago (Johns 1995). The boundary between these floristic regions seems to correspond to a line previously proposed on the basis of distribution of remarkable animals or plants in Malesia. Various faunal or floristic lines have been proposed in Malesia: Haxley's or Merrill's line, Lydekker's line, Wallace's line, Weber's line, Zollinger's line, etc. Some of the lines agree entirely or partly with the eastern or western boundaries of the Central floristic region and others run within the floristic region. The Lydekker's faunal line seems to correspond with the floristic boundary between the Eastern and Central floristic regions.

The distribution patterns of the 13 genera of *Desmodium* and relatives are diverse in Malesia. The monotypic *Monarthrocarpus* is endemic to Malesia and is apparently confined to the Central and Eastern Malesia floristic regions. It is known in Maluku, New Guinea, Luzon in the Philippines and Sulawesi. *Hanslia* is also found in the Central and Eastern Malesia floristic regions and Australia but not in continental Asia.

Five genera are distributed in continental Asia and Malesia: *Desmodiastrum*, *Hegnera*, *Hylodesmum*, *Ohwia*, and *Trifidacanthus*, but their distribution patterns differ from each other within these regions. With the exception of *Hylodesmum* these genera are represented by only a single species each in Malesia. All species of *Desmodiastrum* (4 spp.) are confined to India except *Desmodiastrum parviflorum*, which extends to East Jawa in the Western Malesia floristic region, but is not found elsewhere in Indo-China. *Hegnera* is distributed in Myanmar, Thailand, Indo-China, and in Jawa, Malay Peninsula, and Sumatera in the Western Malesia floristic region. *Ohwia* is widely distributed in India, Sri Lanka, Nepal, Sikkim, Bhutan, Myanmar, Vietnam, Laos, and E. Asia, but in Malesia is confined to the Western Malesia floristic region. *Hegnera* and *Ohwia* are considered to be derived in Malesia from Indo-China, but it is possible that *Desmodiastrum* migrated to Malesia directly, rather than through Indo-China. *Trifidacanthus* is monotypic and rare, being found sporadically in Hainan, south Vietnam, Luzon and Lombok. This suggests a connection between the Central Malesia floristic region and southern China. *Hylodesmum* has four species in Malesia: *H. laxum*, *H. leptopus* and *H. repandum* are common and widely distributed in Malesia, but *H. podocarpum* is rare and known only in Luzon, the Philippines.

The remaining six genera (*Aphyllodium*, *Codariocalyx*, *Dendrolobium*, *Desmodium*, *Phyllodium*, and *Tadehagi*) contain species distributed widely in continental Asia through Malesia to Australia, but their distribution patterns are individually characteristic. *Aphyllodium* comprises eight species including four endemic to Australia (Pedley 1999), one each endemic to New Guinea (*A. novoguineense*) and Myanmar (*A. hispidum* (Schindl.) H. Ohashi; Ohashi 1997b), one confined to New Guinea and Australia (*A. schindleri*), and only *A. biarticulatum* distributed widely in Sri Lanka, India, Myanmar, Indo-China, Hainan, Western and Central Malesia and Australia. Thus there are three species in Malesia, but there is a distant gap in the distribution of *A. biarticulatum* between Jawa/Sulawesi and Australia. This disjunction straddles the range of the two East Malesian species, *A. novoguineense* (New Guinea) and *A. schindleri* (New Guinea/northern Australia).

Dendrolobium comprises 19 species and is abundant in Indo-China (9 spp.) and Malesia to Australia (7 spp.) (Ohashi in Lewis et al. in prep.). It includes four species endemic to Malesia of which three are from the Philippines. *Dendrolobium papuacola* is endemic to New Guinea and close to *D. arbuscula* which is distributed in New Guinea, northern Australia and Fiji. *Dendrolobium rugosum* is apparently part of the Indo-Chinese floristic element and is confined to Malay Peninsula in Malesia. It seems to be derived from continental Asia. *Dendrolobium triangulare* and *D. umbellatum* are widespread species, but the former occurs on hills or low altitude montane sides, while the latter is coastal.

Desmodium includes one species (*D. bolsteri*) endemic to the Philippines, 15 species common in Asia, eight in Australia and only three covering both continents. Of the 15 species distributed in continental Asia only five are found in New Guinea, while all the eight of the Australian species are distributed in New Guinea. This pattern of distribution shows that *Desmodium* of New Guinea and Australia appears to be closely related than that between New Guinea and the regions west of New Guinea treated in this paper (Central and Western Malesia floristic regions and continental Asia).

Phyllodium appears to have undergone a major radiation in Indo-China where six of eight species of the genus occur. Four of these six species are almost endemic to the region. In Malesia, *Phyllodium pulchellum* is widely distributed, but *P. vestitum* is confined to the Malay Peninsula and *P. elegans* var. *javanicum* to Java (var. *elegans* is confined to Indo-China and southern China). *Tadehagi* is represented by *T. triquetrum* in Malesia. It shows unique variation in the Philippines, Lesser Sunda islands and New Guinea (Ohashi 2003). The genus is rare in Australia: *T. triquetrum* is uncertain in Australia and only one endemic *T. robustum* is known in north Western Australia (Pedley 1999).

2. Distribution of species in Malesia

Species of *Desmodium* and its related genera may be considered difficult to interpret in terms of distribution due to their weedy nature and remarkable ability for dispersal of seeds. However, many species have definite distribution patterns. Those represented by introduced and widespread species are exceptional. Of the sixty-four species I recognize in the group in Malesia, eight species of *Desmodium* are introductions from tropical or subtropical America. Fifty-six are native species of which 27 belong to *Desmodium*, eight to *Dendrolobium*, four to *Hylodesmum*, three to each of *Aphyllodium*, *Codariocalyx* and *Phyllodium*, two to *Hanslia*, and one each in *Desmodiastrum*, *Hegnera*, *Monarthrocarpus*, *Ohwia*, *Tadehagi*, and *Trifidacanthus*. The native Malesian species are diverse in distribution pattern, and are primarily divided into four groups: 1) species endemic to Malesia, 2) species distributed in Malesia and continental Asia, 3) species distributed in Malesia and Australia, and 4) species distributed in the whole area from continental Asia through Malesia to Australia. These groups are referred to here as Malesia group, Asia group, Australia group and Asia-Australia group, respectively (Table 1).

(i) Malesia group

The eight following species (14 % of the 56 native Malesian species) are distributed as indicated in parentheses after each name: *Aphyllodium novoguineense* (New Guinea), *Dendrolobium cumingianum* (Luzon), *Dendrolobium geesinkii* (Luzon), *Dendrolobium papuacola* (New Guinea), *Dendrolobium quinquepetalum* (Luzon and rarely in Mindoro), *Desmodium bolsteri* (Luzon), *Hanslia hentyi* (New Guinea and newly in Borneo) and *Monarthrocarpus securiforme* (Luzon and Isabela islands in the Philippines, Maluku, and New Guinea).

The following two subspecies are also endemic to Malesia: *Desmodium nemorosum* subsp. *whitfordii* is endemic to Luzon and *Desmodium strigillosum* subsp. *celebicum* is confined to Sulawesi. *Tadehagi triquetrum* produces hybrids (nothosubsp. *philippinense*) between subsp. *triquetrum* and subsp. *pseudotriquetrum* in Luzon, Palawan, and New Guinea. The hybrid is divided into two varieties: var. *philippinense* in Luzon and var. *palawanense* in Palawan and New Guinea. These subspecies and nothosubspecies belong actually to the Malesia group, but they are not treated in this phytogeographical consideration as separate

Table 1. Distribution patterns of species in *Desmodium* and relatives in Malesia

Malesia group	Asia group	Australia group	Asia-Australia group
Aphyllodium novoguineense	*Codariocalyx gyroides*	*Aphyllodium schindleri*	*Aphyllodium biarticulatum*
Dendrolobium cumingianum	*C. motorius*	*Dendrolobium arbuscula*	*Codariocalyx microphyllus*
D. geesinkii	*Dendrolobium rugosum*	*Desmodium brachypodium*	*Dendrolobium umbellatum*
D. papuacola	*D. triangulare*	*D. filiforme*	*Desmodium gangeticum*
D. quinquepetalum	*Desmodiastrum parviflorum*	*D. gunnii*	*D. heterocarpon*
Desmodium bolsteri	*Desmodium auricomum*	*D. nemorosum*	*D. triflorum*
Hanslia hentyi	*D. capitatum*	*D. pullenii*	*Phyllodium pulchellum*
Monarthrocarpus securiforme	*D. dichotomum*	*D. rhytidophyllum*	*Tadehagi triquetrum*
[5 gen. 8 spp.]	*D. diffusum*	*D. tenax*	[6 gen. 8 spp.]
	D. heterophyllum	*D. trichostachyum*	
	D. laxiflorum	*Hanslia ormocarpoides*	
	D. megaphyllum	[4 gen. 11 spp.]	
	D. renifolium		
	D. rubrum		
	D. sequax		
	D. strigillosum		
	D. styracifolium		
	D. teres		
	D. velutinum		
	D. zonatum		
	Hegnera obcordata		
	Hylodesmum laxum		
	H. leptopus		
	H. podocarpum		
	H. repandum		
	Ohwia caudata		
	Phyllodium elegans		
	P. vestitum		
	Trifidacanthus unifoliolatus		
	[9 gen. 29 spp.]		

from its mother species.

Among the Malesia group, five species (and one subspecies and one nothovariety) are found in Luzon island in the Philippines, and four species (and one nothovariety) are found in New Guinea. In addition, one subspecies of an Asian group is endemic to Sulawesi, *Desmodium strigillosum* subsp. *celebicum.* With the exception of *Monarthrocarpus securiforme*, which is found widely in Malesia (Maluku, New Guinea, Philippines and Sulawesi), other endemic species occur in locally limited habitats.

A disjunction between the Western and Eastern Malesia floristic regions is apparent in the distribution pattern of *Hanslia hentyi* and *Tadehagi triquetrum* nothosubsp. *philippinense* var. *palawanense.*

(ii) **Asia group**

Twenty-nine species (52 % of the 56 native species) are distributed in Malesia and continental Asia (excluding southern half of Malay Peninsula), but not in Australia. They belong to nine genera as shown in Table 1. *Desmodium heterophyllum* was recorded from Australia by Whele & Frances [in Bot. Bull. Queensland **22**: 14 (1920)] but the species is said to be recent introduction to Australia (Pedley 1999). *Desmodium strigillosum* and *D. velutinum* were also regarded as recent introductions (Pedley 1999). *Desmodium renifolium* was recorded from Australia (Meeuwen 1962, Ohashi 1973), but is not included in Pedley's work (1999). I have not examine specimens of the species from Australia.

The Asian group is divided into two subgroups according to their distribution patterns; a general subgroup and a West Malesia subgroup. Species of the general subgroup include 18 species and are found in two or three floristic regions in Malesia, but the others include 11 species and are distributed only in the West Malesia floristic region. The latter subgroup contains *Dendrolobium rugosum, Desmodiastrum parviflorum, Desmodium auricomum, D. renifolium, D. rubrum, D. teres, Hegnera obcordata, Hylodesmum podocarpum, Ohwia caudata, Phyllodium elegans*, and *P. vestitum.*

Dendrolobium rugosum, Desmodium rubrum, and *Phyllodium vestitum* are noteworthy as they are confined only to the Malay Peninsula. Infraspecific taxa of *D. heterocarpon* (i.e., subsp. *angustifolium* and subsp. *ovalifolium*) and *D. strigillosum* (i.e., subsp. *strigillosum*) are also limited to the region. *Desmodium heterocarpon* subsp. *angustifolium* is confined to the Malay Peninsula, but subsp. *heterocarpon* is widely distributed, belonging to the Asia-Australia group. *Hylodesmum podocarpum* and its infraspecific taxa are common in continental Asia, but is very rare in Malesia: subsp. *podocarpum* is known rarely from Luzon in the Philippines (Fig. 8) and subsp. *oxyphyllum* is probably not found in Malesia. The taxa of the West Malesia subgroup are considered to have come into the area from continental Asia.

Of the 29 species belonging to the Asia group, *Desmodiastrum parviflorum* is the only example that is disjunctively distributed in India and Jawa. *Desmodium dichotomum* has a similar distribution pattern, occurring in India, China (Yunnan) and Malesia (Jawa, Lesser Sunda Islands, and Sulawesi). They are not in Indo-China or Thailand.

Trifidacanthus unifoliolatus shows a unique distribution pattern in the Asia group. It is a rare species and is found only in one or a few localities in Hainan, southern Vietnam (Phu Khanh), Luzon, Lombok and Flores. Its principal areas of distribution are around the South China Sea, and disjunctively Lesser Sunda Islands. The species is not known from Indo-China except for the one locality in southern Vietnam and the West Malesia floristic region in Malesia.

Desmodium sequax is widely distributed in montane areas in Northern India, Nepal, Sikkim, Bhutan, Myanmar, Thailand, Malesia, Laos, Vietnam, China, and Taiwan. It usually occurs above 600 m altitude, although it has been collected between 200 m (in Vietnam) and 2850 m (in China) above sea level. It is distributed sporadically in Malesia (Maluku, New Guinea, Philippines, Sulawesi, and Sumatera), where it is apparently confined to high altitudes. This distribution pattern suggests that the species may spread by birds and may be imported from continental Asia. The distribution pattern is similar to that of *Ohwia caudata.*

(iii) **Australia group**

The following eleven species (20 % of the 56 native Malesian species) are found in Malesia and Australia (areas in Malesia are shown in parentheses): *Aphyllodium schindleri* (New Guinea), *Dendrolobium arbuscula* (New Guinea), *Desmodium brachypodium* (New Guinea), *D. filiforme* (Jawa and New Guinea), *D. gunnii* (New Guinea), *D. nemorosum* subsp. *nemorosum* (New Guinea; subsp. *whitfordii* belongs to the Malesia group), *D. pullenii* (Alor in the Lesser Sunda Islands and New Guinea), *D. rhytidophyllum* (New Guinea), *D. tenax* (New Guinea), *D. trichostachyum* (Maluku and New Guinea), and *Hanslia ormocarpoides* (many places in Malesia and New Hebrides) (Table 1). As can be seen, in Malesia, these species are mainly distributed in or even confined to New Guinea. All except *Hanslia ormocarpoides* occur more frequently in Australia where they are often widely distributed. *Desmodium filiforme* is disjunctively distributed in Jawa from New Guinea and northern Australia. It is close to *D. pullenii*, which is found in Alor in Malesia and northern Australia. Direct dispersals from northern Australia to Jawa or Alor, rather than via New Guinea, are supposed from their distribution patterns.

(iv) **Asia-Australia group**

Eight species (14 % of the native Malesian species) occur across Malesia, continental Asia, and Australia (Table 1). *Tadehagi triquetrum* was recorded from Australia by Meeuwen (1961), but, according to Pedley (1999), its occurrence seems dubious.

Several other species need to be confirmed as native to Australia or not. *Codariocalyx motorius* was first recorded from Australia by Holtze in 1892 (Chapman 1991), *Desmodium renifolium* by Bailey in 1900 (Chapman 1991) and *D. repandum* by Meeuwen (1962), but Pedley (1996, 1999) denied their occurrence in Australia. I have not found specimens of these species from Australia and therefore include them in the Asia group in this study.

Codariocalyx microphyllus, *Desmodium heterocarpon*, *D. velutinum* and *Tadehagi triquetrum* are included in this group, but their infraspecific taxa show different patterns of distribution from the type taxa. *Codariocalyx microphyllus* occurs widely in Malesia and continental Asia and less frequently in northeastern Australia, but it has a variety endemic to Assam and a form to Nepal (Ohashi 1984). *Desmodium heterocarpon* subsp. *heterocarpon* belongs to the Asia-Australia group, while subsp. *angustifolium* and subsp. *ovalifolium* are not found in Australia, so the latter two subspecies belong to the Asia group. *Desmodium velutinum* is divided into subsp. *velutinum* and subsp. *longibracteatum*; the latter subspecies belongs to the Asia group. *Tadehagi triquetrum*, though its distribution in Australia is dubious, includes subsp. *pseudotriquetrum* of the Asia group. Subsp. *pseudotriquetrum* is frequent in continental Asia but rare in Malesia where it is only found sporadically in New Guinea and the Philippines. From their distribution patterns and infraspecific differentiation patterns *Codariocalyx microphyllus*, *Desmodium heterocarpon*, *D. velutinum*, and *Tadehagi* *triquetrum* may be regarded mainly as members of the Asia group.

Among other members of the Asia-Australia group, *Aphyllodium biarticulatum, Desmodium gangeticum, D. triflorum*, and *Phyllodium pulchellum* may also be regarded as members of the Asia group on the basis of their distribution patterns. Only *Dendrolobium umbellatum* is different from the other members of the Asia group. It is a coastal plant and disperses the seeds enclosed in corky pericarp by an ocean current. With the exception of the last species, all members of the Asia-Australia group are considered as originally distributed in Asia.

3. Comparisons of *Desmodium* and related genera between Jawa, New Guinea and the Philippines

Comprehensive works for Leguminosae were provided by Merrill (1923) for the Philippines, Backer and Bakhuizen van den Brink Jr. (1963) for Jawa and Verdcourt (1979) for New Guinea. *Desmodium* and related genera in these regions appear to be better known than in other regions in Malesia. However, Jawa is estimated as having been botanized more than 2–4 times more intensively than the Philippines and Papua New Guinea based on comparisons of previous collections in each regions (Campbell and Hammond 1989, Johns 1995). The relatively recent discoveries of such distinct species as *Desmodium hentyi* Verdc. from near Lae in Papua New Guinea, *Dendrolobium papuacola* from Loloki River in Papua New Guinea and *Dendrolobium geesinkii* from Luzon may reflect a paucity of collections of *Desmodium* and related genera from New Guinea and the Philippines. In spite of the disparity in the inventories among these regions, I have attempted a preliminary comparison of species and distribution patterns for the genera in the areas:

(i) **Jawa**: Thirty-one species of *Desmodium* and related genera were recorded from Jawa (Backer and Bakhuizen van den Brink Jr. 1963), of which 28 were considered to be native. The three excluded species are naturalized from America, *Desmodium adscendens* (var. *trifoliastrum*), *D. tortuosum*, and *D. uncinatum*. Thirty-one species are recognized as native to Jawa in this paper and are classified into the following 10 genera: *Aphyllodium biarticulatum* (not included in Backer and Bakh. f.), *Codariocalyx* 3 spp. (as *Desmodium gyroides*, *D. microphyllum*, and *D. motorium* in Backer and Bakh. f.), *Dendrolobium* 2 spp. (as *Desmodium triangulare* and *D. umbellatum* in Backer and Bakh. f.), *Desmodiastrum parviflorum* (as *Desmodium alysicarpoides* in Backer and Bakh. f.), *Desmodium* 16 spp. (15 species in Backer and Bakh. f., of which *D. lasiocarpum* is synonymous; and *D. diffusum* and *D. teres* are added), *Hegnera obcordata* (as *Desmodium obcordatum* in Backer and Bakh. f.), *Hylodesmum* 3 spp. (as *Desmodium laxum* and *D. repandum* in Backer and Bakh. f.; and *Hylodesmum leptopus* is added, but *H. podocarpum* is dubious and excluded), *Ohwia* 1 sp. (as *Desmodium caudatum* in Backer and Bakh. f.), *Phyllodium* 2 spp. (as *Desmodium blandum* and *D. pulchellum* in Backer and Bakh. f.), and *Tadehagi triquetrum* (as *Desmodium triquetrum* in Backer and Bakh. f.) (Table 2).

Distribution patterns of these species are as follows: 22 species belong to the Asia group (71 % of the 31 native species in Jawa), one (*Desmodium filiforme*) to the Australia group (3 % of species in Jawa), and eight belong to the Asia-Australia group (26 % of Javanese natives). All species except *Desmodium filiforme* relate to continental Asia in distribution.

(ii) **New Guinea**: Verdcourt (1979) recorded 33 species including one unknown from New Guinea, of which seven were in-

Table 2. Distribution of *Desmodium* and related species in Jawa, the Philippines and New Guinea with those in Indo-China and Australia

	Indo-China[1]	Jawa	Philippines	New Guinea	Australia[2]
(Species common in Jawa, the Philippines and New Guinea)					
Codariocalyx microphyllus	●	●	●	●	●
Dendrolobium umbellatum	●	●	●	●	●
Desmodium gangeticum	●	●	●	●	●
D. heterocarpon	●	●	●	●	●
D. heterophyllum	●	●	●	●	●
D. triflorum	●	●	●	●	●
D. velutinum	●	●	●	●	●
Phyllodium pulchellum	●	●	●	●	●
Tadehagi triquetrum	●	●	●	●	●
Codariocalyx gyroides	●	●	●	●	
Desmodim diffusum	●	●	●	●	
D. laxiflorum	●	●	●	●	
D. sequax	●	●	●	●	
D. zonatum	●	●	●	●	
Hylodesmum laxum	●	●	●	●	
H. leptopus	●	●	●	●	
H. repandum	●	●	●	●	
(Species common in Jawa and the Philippines, Jawa and New Guinea or the Philippines and New Guinea)					
Codariocalyx motorius	●	●	●		
Desmodium capitatum	●	●	●		
D. filiforme		●		●	●
D. nemorosum			●[3]	●[4]	●[4]
Hanslia ormocarpoides			●	●	●
Monarthrocarpus securiforme			●	●	
(Species found in Jawa, the Philippines or New Guinea)					
Aphyllodium biarticulatum	●	●			
Dendrolobium triangulare	●	●			
Desmodiastrum parviflorum		●			
Desmodium auricomum	●	●			
D. dichotomum		●			
D. megaphyllum	●	●			
D. renifolium	●	●			
D. teres	●	●			
Hegnera obcordata	●	●			
Ohwia caudata	●	●			
Phyllodium elegans	●[5]	●[6]			
Desmodium styracifolium	●		●		
Hylodesmum podocarpum	●		●		
Trifidacanthus unifoliolatus	●		●		
Dendrolobium cumingianum			●		
D. geesinkii			●		
D. quinquepetalum			●		
Desmodium bolsteri			●		
Aphyllodium schindleri				●	●
Dendrolobium arbuscula				●	●
Desmodium brachypodium				●	●
D. gunnii				●	●
D. pullenii				●	●
D. rhytidophyllum				●	●
D. tenax				●	●
D. trichostachyum				●	●
Aphyllodium novoguineense				●	
Dendrolobium papuacola				●	
Hanslia hentyi				●	

[1]Dy Phon, Ohashi and Vidal (1994), [2]Pedley (1999), [3]subsp. *whitfordii*, [4]subsp. *nemorosum*, [5]var. *elegans*, [6]var. *javanicum*.

troduced from America. Thirty-two indigenous species are recognized in this study including Verdcourt's unknown (= *Desmodium sequax*) (Table 2). They are *Aphyllodium* 2 spp. (as *Desmodium biarticulatum* in Verdcourt, but is *Aphyllodium novoguineense*; and *A. schindleri* is added), *Codariocalyx* 2 spp. (as *Desmodium gyroides* and *D. microphyllum* in Verdcourt), *Dendrolobium* 3 spp.(as *Desmodium umbellatum* in Verdcourt, but *Dendrolobium arbuscula* and *D. papuacola* are added), *Desmodium* 17 spp. (14 species in Verdcourt; and *Desmodium diffusum*, *D. pullenii* and *D. tenax* are added), *Hanslia* 2 spp. (as *Desmodium hentyi* and *D. ormocarpoides* in Verdcourt), *Hylodesmum* 3 spp. (as *Desmodium laxum* and *D. repandum* in Verdcourt; *Hylodesmum leptopus* is added), *Monarthrocarpus* 1 sp. (as *Desmodium securiforme* in Verdcourt), *Phyllodium* 1 sp. (as *Desmodium pulchellum* in Verdcourt), and *Tadehagi* 1 sp. (as *Desmodium triquetrum* in Verdcourt). Additions to Verdcourt (1979) are seven species, i. e., *Aphyllodium schindleri* (as *D. biarticulatum* var. *australiense* in Verdcourt), *Dendrolobium arbuscula*, *D. papuacola*, *Desmodium diffusum*, *D. pullenii*, *D. tenax* (as *D. rhytidophyllum* subsp. *acutifoliolum* in Verdcourt), and *Hylodesmum leptopus* (as *D. laxum* subsp. *leptopus* in Verdcourt).

Thirty-two species of *Desmodium* and relatives in New Guinea comprise four species of the Malesia group including two endemic species (*Aphyllodium novoguineense* and *Dendrolobium papuacola*), 10 from the Asia group, 11 from the Australia group, and seven from the Asia-Australia group. All species of the Australia group (i. e. 100 %) are found in New Guinea, whilst 10 of the 29 species of the Asia group known in Malesia (34 %) are found in New Guinea. It is apparent that the members of *Desmodium* and relatives in New Guinea have stronger ties to Australian taxa than continental Asian ones. The distribution boundary between the Asia and Australia groups in these genera seems to agree with that of Malesia and Papuasia.

Among the Asia-Australia group only *Aphyllodium biarticulatum* is not found in New Guinea, although this species is widely but sporadically distributed in Asia, Malesia and Australia. However, in New Guinea, there is one endemic species of *Aphyllodium* as well as a member of the Australia group. Differentiation of the genus in New Guinea and Australia needs to be studied.

(iii) **The Philippines**: Merrill (1923) enumerated 32 species of *Desmodium* and one species of each of *Monarthrocarpus* and *Trifidacanthus* in the Philippines of which 30 species are native to the region (Table 2). *Desmodium malacophyllum*, *D. procumbens*, *D. scorpiurus* and *D. trifoliastrum* are excluded from his list as species introduced from America. Twenty-nine species are recognized in this paper and are reclassified as follows: *Codariocalyx* 3 spp. (as *Desmodium gyrans*, *D. gyroides* and *D. microphyllum* in Merrill), *Dendrolobium* 4 spp. (as *Desmodium cumingianum*, *D. quinquepetalum* and *D. umbellatum* in Merrill; and *Dendrolobium geesinkii*), *Desmodium* 13 spp. (as 14 species in Merrill in which *D. buergeri*, *D. lasiocarpum* and *D. ovalifolium* are synonymous; and *D. diffusum* and *D. nemorosum* (subsp. *whitfordii*) are added); *Hanslia ormocarpoides* (as *Desmodium ormocarpoides* in Merrill), *Hylodesmum* 4 spp. (as *Desmodium laxum*, *D. podocarpum*, and *D. scalpe* in Merrill; and *Hylodesmum leptopus* is added), *Monarthrocarpus securiforme* (as in Merrill), *Phyllodium pulchellum* (as *Desmodium pulchellum* in Merrill), *Tadehagi triquetrum* (as *Desmodium auriculatum*, *D. pseudotriquetrum* and *D. triquetrum* in Merrill) and *Trifidacanthus unifoliolatus* (as in Merrill).

The distribution patterns of these species fit with the Malesia, Asia, Australia, and Asia-Australia groups. The Malesia group comprises five species (17 % of native species in the Philippines), i. e., *Dendrolobium cumingianum*, *D. geesinkii*, *D. quinquepetalum*, *Desmodium bolsteri*, and *Monarthrocarpus securiforme*. The Asia group includes the following 15 species (52 % of species in the Philippines): *Codariocalyx gyroides*, *C. motorius*, *Desmodium capitatum*, *D. diffusum*, *D. heterophyllum*, *D. laxiflorum*, *D. sequax*, *D. styracifolium*, *D. velutinum*, *D. zonatum*, *Hylodesmum laxum*, *H. leptopus*, *H. podocarpum*, *H. repandum*, and *Trifidacanthus unifoliolatus*. The Australia group comprises two species (7 % of species in the Philippines), *Desmodium nemorosum* (subsp. *whitfordii*) and *Hanslia ormocarpoides*. The Asia-Australia group has seven representatives in the Philippines (24 % of the area's species), i. e., *Codariocalyx microphyllus*, *Dendrolobium umbellatum*, *Desmodium gangeticum*, *D. heterocarpon*, *D. triflorum*, *Phyllodium pulchellum* and *Tadehagi triquetrum*.

Geographically, the Philippines lies close to south China and Taiwan. Most of the species belonging to the Asia and Asia-Australia groups are also found in China and/or Taiwan, while the two species of the Australia groups found in the Philippines do not occur in China and Taiwan. This indicates a close distributional relationship in *Desmodium* and related genera between the Philippines and south China and Taiwan.

(iv) **Comparison between Jawa and New Guinea**: Thirty-one species of *Desmodium* and relatives are recorded from Jawa and 32 from New Guinea. Such similarity in numbers of species may suggest those in New Guinea are poorly known in the light of its larger areas, richness of environmental conditions and remaining undeveloped natural areas. It seems probable that more new species will be found in New Guinea in future.

Of the 31 Javanese species, 18 are in common with New Guinea (58 % of all species in Jawa), and 13 are not found in New Guinea (Table 2). With the exception of *Codariocalyx motorius* and *Desmodium capitatum* the remaining 11 Jawanese species not found in New Guinea are also not distributed in the Philippines

Fourteen species from New Guinea (44 % of New Guinea species) are not found in Jawa (Table 2). Other than the four species belonging to the Malesia group, the remaining species (10 spp.) all belong to the Australia group (Table 1). This indicates that the species of Desmodium and its relatives in New Guinea are very close to those of Australia but those in Jawa are not.

(v) **Comparison between Jawa and the Philippines**: Jawa and the Philippines have nearly equal number of species in the genera treated in this paper. Nineteen species of Jawa (61 % of the island's species) are also found in the Philippines (Table 2), but 12 species (the remaining 39 %) are indigenous to Jawa (Table 2). The Jawanese species absent in the Philippines suggest a close connection between Jawa and Indo-China and India in distribution, because they are found in Indo-China and/or India, but not (or only rarely) in China. *Desmodiastrum parviflorum*, *Desmodium auricomum*, *D. teres*, *Hegnera obcordata*, and *Phyllodium elegans* var. *javanicum* are not distributed in China, *Aphyllodium biarticulatum* is only known in Hainan and *Desmodium dichotomum* and *D. megaphyllum* are found in Yunnan in China.

Apart from four species endemic to the Philippines, the following six species of the Asia and Asia-Australia groups are not found in Jawa: *Desmodium nemorosum*, *D. styracifolium*, *Hanslia ormocarpoides*, *Hylodesmum podocarpum*, *Monarthrocarpus securiforme*, and *Trifidacanthus unifoliolatus*. *Hylodesmum podocarpum* is very rare in Luzon and is not found in Indo-China but is common in continental China and Japan. Its ranges from NW India, through Nepal, China, Taiwan, Korea and into Japan. *Trifidacanthus unifoliolatus* is a very rare species not only in Malesia but also in China and Vietnam. These facts may indicate that species in *Desmodium* and related genera in the Philippines are remote from Jawa. Three endemic *Dendrolobium* species are characteristic of these genera in the Philippines.

(vi) **Comparison between New Guinea and the Philippines**: Twenty species from New Guinea are also found in the Philippines (Table 2). Twelve New Guinean species, all of which belong to the Australia group, are absent from the Philippines (Table 3). *Desmodium nemorosum* is distributed in both regions, but separated into subsp. *nemorosum* in New Guinea and subsp. *whitfordii* endemic to the Philippines. *Codariocalyx motorius*, *Dendrolobium cumingianum*, *D. geesinkii*, *D. quinquepetalum*, *Desmodium bolsteri*, *D. capitatum*, *D. styracifolium*, *Hylodesmum podocarpum* and *Trifidacanthus unifoliolatus* are not found in New Guinea. With the exception of four endemics, the remaining Philippine species all belong to the Asia group and show a close distributional association to Indo-China and China, not to New Guinea.

4. Diversity and distribution in *Desmodium* and related genera in Malesia

The origin of diversity in genera and species as well as distribution patterns of *Desmodium* and its related genera in Malesia is considered here. These genera are most diverse in the Sino-Indian region and are considered to have primarily originated and differentiated in this region (Ohashi et al. 1981). They are included in the subtribe Desmodiinae. Fossil woods of *Ougeinia* (= *Desmodium* in Ohashi 1973 but is recognized as distinct, cf. Nemoto and Ohashi 2003) were found from the Miocene of Assam, India (cf. Wheeler and Baas 1992), leaves of *Codariocalyx* (as *Desmodium* cf. *microphyllum*), *Desmodium* and *Phyllodium* (as *D. pulchellum*) from the Miocene of China (Guo and Zhou 1992) and leaflet impressions of *Desmodium* from the Pleiocene of Western Caucasus (Shakryl 1992). These records suggest that the genera of Desmodiinae were differentiated rather quickly in the Miocene (Tertiary), because both taxa and localities are diverse. I interpret the Malesian taxa of *Desmodium* and related genera as derived from ancestral species from the Sino-Indian region. There is no evidence to indicate the time initiate expansion of distribution of those genera from Sino-Indian regions to Malesia. It is supposed that it occurred probably in the Miocene. Immigration must have been done from time to time since then when geographic and climatic corridors were available for colonization. Malesian taxa appear to have settled and differentiated in several major regions following this expansion of Sino-Indian ancestors. Subsequent immigration must have stemmed from Australia which appears to be one of the areas of differentiation of *Desmodium.* Subgenus Sagotia of the genus seems an example that differentiated secondarily in Australia where 24 species including 9 endemics are known (Pedley 1999). All species of *Desmodium* in the Australia group (Table 1) belong to the subgenus, and it is recognized as the most advanced group in *Desmodium* (Ohashi 1973). The concentration of endemic species in Luzon and New Guinea seems to be the most remarkable feature in the evolution of the *Desmodium* group in Malesia. It is natural that the present-day composition and distribution of taxa in *Desmodium* and its related genera in Malesia are diverse, because they are derived from various spatially and temporally diverse ancestors.

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大橋広好：**Malesia**のマメ科シバハギ属と近縁属の分類と分布（**II**）

本研究ではMalesiaのシバハギ属とその近縁属は13属65種よりなることを明らかにした．前編（本誌79巻2号）の*Aphyllodium*から*Desmodium*までに続いて，この後編では*Hanslia*から*Trifidacanthus*までの8属14種について分類学的な整理を行った．またMalesiaにおけるシバハギ属と近縁属について分布を整理し，系統進化的な考察を試みた．

*Hanslia*はMalesiaに固有の属で，形態および花粉形質においてミソナオシ属に類似するが，柱頭が花柱の側面につく点で異なる．*Hanslia hentyi*は1977年にニューギニアから1点だけの果期の標本に基づいて記載された種であった．その後やはりニューギニアからの標本が2点見付かったが，花も果実もない標本であった．今回の標本はKewから未同定のままLeidenに貸し出されていたもので，断片的な花と数個の花蕾とをつけている（Fig. 5）．これが4枚目の標本であり，Borneoからの初発見である．本種については完全な状態の花は未知であり，この種の正体はまだ分からない点がある．

ヌスビトハギ属はMalesiaに4種が分布する．*Hylodesmum repandum*はこの属で唯一アフリカにも分布する種であるが，形態的にはマルバヌスビトハギに類似し，しばしば誤ってそれと同定されている．Verdcourt (1979) によれば，New Guineaの*H. repandum*は帰化であろうという．オオバヌスビトハギ*Hylodesmum laxum* (DC.) H. Ohashi & R. R. Millとトキワヤブハギ*H. leptopus* (A. Gray ex Benth.) H. Ohashi & R. R. MillはMalesiaに広く分布し，New Guineaまで見られる．一方マルバヌスビトハギ*H. podocarpum* (DC.) H. Ohashi & R. R. Mill subsp. *podocarpum*はMalesiaではルソン島にだけ生育し（Fig. 8），ここが分布の南限である．マルバヌスビトハギは日本と中国にはふつうであるが，台湾中部南投県と嘉義県に稀であり，台湾北部と沖縄を飛んで九州やアジア大陸に分布する．Malesiaのヌスビトハギ*H. podocarpum* subsp. *oxyphyllum* (DC.) H. Ohashi & R. R. Millとしてはハーバード大学標本館に所蔵されるジャワ島産ミソナオシ標本に貼り付けられている断片的な個体がある．この標本はジャワで1905年に採集されたものである．しかし，この標本によってジャワ島にヌスビトハギがあるとするには疑問が残る．このミソナオシ標本の重複品がロンドンの自然史博物館にもあるが，それはミソナオシだけが貼り付けられた標本である．また，これまでジャワ島からヌスビトハギが記録されたことはなく，一方，ミソナオシはジャワにふつうである．ハーバード大学標本は他の地域で採集されたヌスビトハギが混入されたものである可能性がある．多分Malesia地域にはヌスビトハギは分布しないと思われる．現在のところヌスビトハギは台湾北部が南限である．日本では沖縄本島嘉津宇岳が南限地であり，沖縄における唯一の産地であるが，かっては山原に稀ではなかったときもあったようで，開発などによって生育地が破壊されたという（沖縄県1996沖縄県の絶滅の恐れのある野生生物）．アジア大陸では暖帯から亜寒帯に広く分布する．

Malsesia地域内における13属の分布についてみると，固有属は*Monarthrocarpus*のみ，Malesiaとアジア大陸に分布するのは*Desmodiastrum*，*Hegnera*，ヌスビトハギ属*Hylodesmum*，ミソナオシ属，および*Trifidacanthus*の5属であり，Malesiaとオーストラリアに限られるのは*Hanslia*のみである．残りの6属（*Aphyllodium*，マイハギ属，ナハキハギ属，*Desmodiastrum*，ウチワツナギ属，タデハギ属）はMalesia，アジア大陸，オーストラリアに分布する．なお，マレー半島のほぼ南半分は，植物地理学上のMalesiaに含まれるために，本論文でアジア大陸とよぶ地域からはここを除いている．

次に，Malesiaに自生する57種を対象として種の分布について調べてみた．ここではアメリカからの帰化種である8種を除いて考察する．Malesia

固有種，Malesiaとアジア大陸に分布する種，Malesiaとオーストラリアに分布する種，アジア大陸・Malesia・オーストラリアに分布する種をまとめ，それぞれをMalesia, Asia, Australia, Asia-Australia groupと名付ける．種数をみるとMalesia groupは5属8種（全体の14 %），Asia groupは9属29種（全体の52 %），Australia groupは4属11種（全体の20 %），Asia-Australia groupは6属8種（全体の14 %）であった（Table 1）．種数の比較からみると，Malesiaにおけるシバハギ属と近縁属はアジア大陸の種との関連が顕著である．

Asia groupの種の中ではWestern Malesia floristic region（マレー半島南部，スマトラ，ボルネオ，ジャワ，パラワン島よりなる）にのみ分布する種が11種あり，アジア大陸との結びつきを強く示す．さらにAsia-Australia groupの8種の中でナハキハギ*Dendrolobium umbellatum*を除く他の7種もアジア大陸との結びつきを示す種であると思われる．なお，Malesiaに分布するヌスビトハギ属4種は全てAsia groupに属する．

一方，Malesiaとオーストラリアとの共通種の中にはシバハギ属8種が含まれるが，これらは高度に分化したと考えられる種である．また，固有種の多くは狭い分布域をもつ．*Dendrolobium cumingianum*, *Dendrolobium geesinkii*, *Desmodium bolsteri*はルソン島，*Dendrolobium quinquepetalum*はルソン島と稀にミンドロ島，*Aphyllodium novoguineense*, *Dendrolobium papuacola*はニューギニア，*Hanslia hentyi*はニューギニアと新しくボルネオ島で発見された．ただ1種*Monarthrocarpus securiforme*はルソン，イサベラ，モルッカ，ニューギニアに知られており，広い分布域をもっている．8種のうち5種がルソン島で，4種がニューギニアでみられる．亜種としては*Desmodium nemorosum* subsp. *whitfordii*がルソン島に，*D. strigillosum* subsp. *celebicum*がスラウェシに固有である．雑種*Tadehagi triquetrum* nothosubsp. *philippinense*はフィリピン，パラワン，ニューギニアでみられる．固有種の多くはアジア大陸の種に形態的に最も近く，また固有種がルソン島とニューギニアに集中することはMalesiaにおけるシバハギ属と近縁属の進化に関して問題を解く鍵となる現象であると思われる．

Malesiaの中ではジャワ，ニューギニア，フィリピンがマメ科について他の地域よりもまとまった研究が発表されている．したがって標本も多く，シバハギ属と近縁属の自生種について他の地域よりもよく調べることができた．3地域を比較してみると，ジャワには10属31種，ニューギニアには9属32種，フィリピンには9属29種が認められた（Table 2）．この結果から，まず，3地域がほぼ同数の種数をもつことが注目された．しかし，3地域の間には面積，生育地環境の多様性，開発程度の多少などの条件に明らかな差のあることから推定するに，ニューギニアとフィリピンにはジャワよりも多数の種が生育すると予想される．この結果はニューギニアとフィリピンの調査がジャワのそれに比べて不足していることに起因するためであろうと考えられる．

次に，3地域に共通する種および2地域間ごとの共通種と非共通種とをまとめてみた（Table 2）．ジャワにはインドシナあるいはインドとの共通種がみられ，オーストラリアとの共通種はない．ニューギニアはMalesia固有種とオーストラリアとの共通種とが特色であり，フィリピンにはMalesia固有種と中国との共通種がみられることがわかる．

最後にMalesiaにおいてシバハギ属と近縁属の種類と分布型の多様性とがどのように生まれてきたのかについて考察した．シバハギ属と近縁属はインドから中国に至るアジア大陸で属レベルの分化が見られ，ここで第一次的に分化したと考えられている（Ohashi et al. 1981）．Desmodiinae亜連に属するシバハギ属，*Ougeinia*, *Codariocalyx*, *Phyllodium*の中新世からの化石はインドと中国から発見されている．Malesiaにおいてシバハギ属と近縁属の化石は記録されていないが，Asia groupとAsia-Australia groupの種は基本的にアジア大陸の種に由来して今日Malesiaに分布するに至った種であると考えられる．さらにMalesiaを経てオーストラリアに分布を広げたと予測される．この過程で地方的な種分化がおこり，Malesia固有種であるMalesia groupの種が生まれ，オーストラリアでも種レベルでの分化がおこり，今日Malesiaにみられる Australia groupの種はオーストラリアからMalesiaに侵入したと想像される．Malesiaにおけるシバハギ属と近縁属の多様性は歴史を経て分布を広げてきた進化の結果であると考えられる．

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